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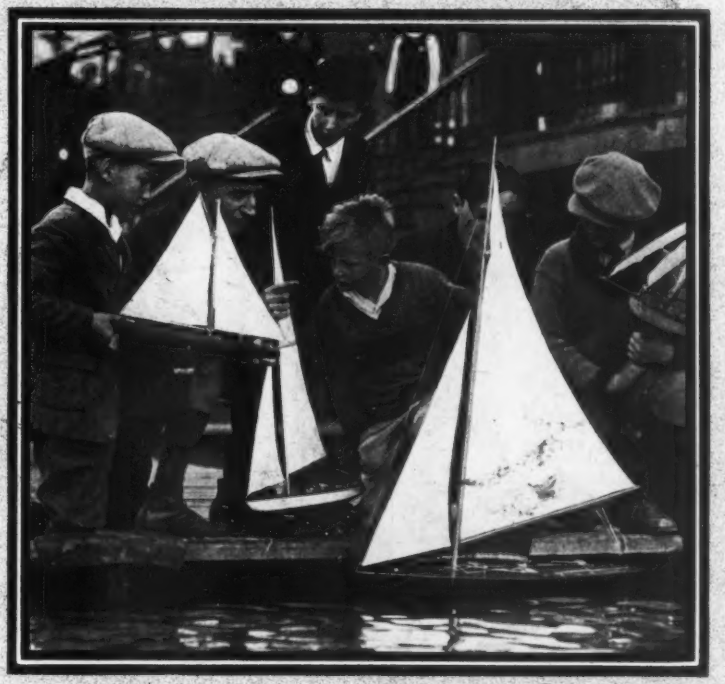
THE INDUSTRIAL-ARTS MAGAZINE



AUGUST 1926

THE BRUCE PUBLISHING COMPANY

MILWAUKEE WISCONSIN

ATKINS
SILVER STEEL SAWS

MANUAL TRAINING INSTRUCTORS

We will loan you an Atkins Silver Steel Demonstrating Saw.

Originated by Atkins

"Saw Sense"
Contains valuable information on roof framing, shingling and care of the saw.

"How to Care For and Use Cross Cut and Hand Saws"
Explains how to fit up cross cut saws, band saws and wood saws so they will give best results.

We will furnish these booklets for your entire class

Correct filing and setting of both rip and cut-off hand saw teeth is clearly brought out — see illustration.

We will loan you one of these saws for a period of eight weeks — it will greatly assist you.

Complete lessons accompany this saw, telling how it can be used to teach your pupils the correct methods of setting and filing hand saws.

We have had so many requests for our demonstrating saws and educational saw literature that we have decided to repeat our offer and give everybody an opportunity of securing the literature and the loan of a demonstrating saw. Write at once on your school stationery.

We can furnish for your classes carpenter aprons with a carpenter pencil included for 35c.

When you buy saws for your school demand ATKINS and get the very best
If your dealer cannot supply you—write us

E.C. ATKINS & CO.

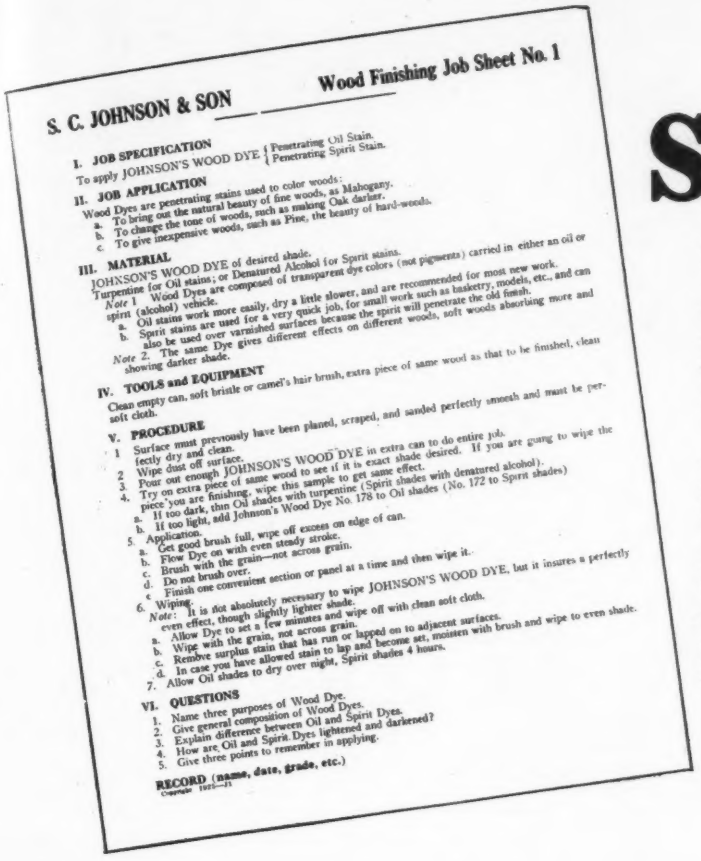
ESTABLISHED 1857 THE SILVER STEEL SAW PEOPLE

Home Office and Factory, INDIANAPOLIS, INDIANA

Canadian Factory, Hamilton Ontario
Machine Knife Factory, Lancaster N.Y.

Branches Carrying Complete Stocks In The Following Cities:

Atlanta	New Orleans	Seattle
Memphis	New York City	Paris, France
Chicago	Portland, Ore.	
Minneapolis	San Francisco	Vancouver, B.C.



S. C. JOHNSON & SON — Wood Finishing Job Sheet No. 1

I. JOB SPECIFICATION
To apply JOHNSON'S WOOD DYE { Penetrating Oil Stain. / Penetrating Spirit Stain.

II. JOB APPLICATION
Wood Dyes are penetrating stains used to color woods:
a. To bring out the natural beauty of fine woods, as Mahogany.
b. To change the tone of woods, such as making Oak darker.
c. To give inexpensive woods, such as Pine, the beauty of hard-woods.

III. MATERIAL
JOHNSON'S WOOD DYE of desired shade.
Turpentine for Oil stains; or Denatured Alcohol for Spirit stains.
Note 1 Wood Dyes are composed of transparent dye colors (not pigments) carried in either an oil or spirit (alcohol) vehicle.
a. Oil stains work more easily, dry a little slower, and are recommended for most new work.
b. Spirit stains are used for a very quick job, for small work such as basketry, models, etc., and can also be used over varnished surfaces because the spirit will penetrate the old finish.
Note 2. The same Dye gives different effects on different woods, soft woods absorbing more and showing darker shade.

IV. TOOLS and EQUIPMENT
Clean empty can, soft bristle or camel's hair brush, extra piece of same wood as that to be finished, clean soft cloth.

V. PROCEDURE
1 Surface must previously have been planed, scraped, and sanded perfectly smooth and must be perfectly dry and clean.
2 Wipe dust off surface.
3. Pour out enough JOHNSON'S WOOD DYE in extra can to do entire job.
4. Try on extra piece of same wood to see if it is exact shade desired. If you are going to wipe the piece you are finishing, wipe this sample to get same effect.
a. If too dark, thin Oil shades with turpentine (Spirit shades with denatured alcohol).
b. If too light, add Johnson's Wood Dye No. 178 to Oil shades (No. 172 to Spirit shades)
5. Application.
a. Get good brush full, wipe off excess on edge of can.
b. Flow Dye on with even steady stroke.
c. Brush with the grain—not across grain.
d. Do not brush over.
e. Finish one convenient section or panel at a time and then wipe it.
6. Wiping.
Note: It is not absolutely necessary to wipe JOHNSON'S WOOD DYE, but it insures a perfectly even effect, though slightly lighter shade.
a. Allow Dye to set a few minutes and wipe off with clean soft cloth.
b. Wipe with the grain, not across grain.
c. Remove surplus stain that has run or lapped on to adjacent surfaces.
d. In case you have allowed stain to lap and become set, moisten with brush and wipe to even shade.
7. Allow Oil shades to dry over night, Spirit shades 4 hours.

VI. QUESTIONS
1. Name three purposes of Wood Dye.
2. Give general composition of Wood Dyes.
3. Explain difference between Oil and Spirit Dyes.
4. How are Oil and Spirit Dyes lightened and darkened?
5. Give three points to remember in applying.

RECORD (name, date, grade, etc.)

JOB SHEETS

Have you ever wished for something that would save you half the endless explaining you have to do? Could your students use a clear, simple, *practical* outline that would enable them to do their job right and know WHY they are doing it?

Johnson Job Sheets on Wood Finishing cover the application of Stain, Filler, Under-Lac (shellac), Enamel, Undercoat, Wax, Varnish and Varnish Rubbing. They combine the latest and best educational practice with the most expert practical experience. And to all users of Johnson Finishes they are

FREE

Making the Most of Your Budget

How do you buy? A pint of this, and a gallon of that, just as the need comes? Just any "varnish" or "stain" somebody shoves across the counter? Sometimes good, sometimes bad?

Those boys learning to do things Right, deserve the Best—perfect materials and reliable materials every time. But the busy instructor or supervisor hasn't time to "shop." The easiest solution in the world is the Special JOHNSON SCHOOL ASSORTMENT.

This Assortment will take care of 99% of your shop needs. It will give your students the finest materials manufactured and the funds available for your department will go farther and enable you to accomplish more.

The Johnson's school assortment includes **FREE** demonstrating materials — display panels — Text-books —a complete set of Job Sheets for *every boy* in your classes. And it will save you money!

Ask about it NOW!

S. C. JOHNSON & SON, Dept. IA8, RACINE, WIS.
"The Wood Finishing Authorities"

Please send me a specimen set of Johnson Job Sheets and all information concerning your Special School Assortment of Johnson Finishes.

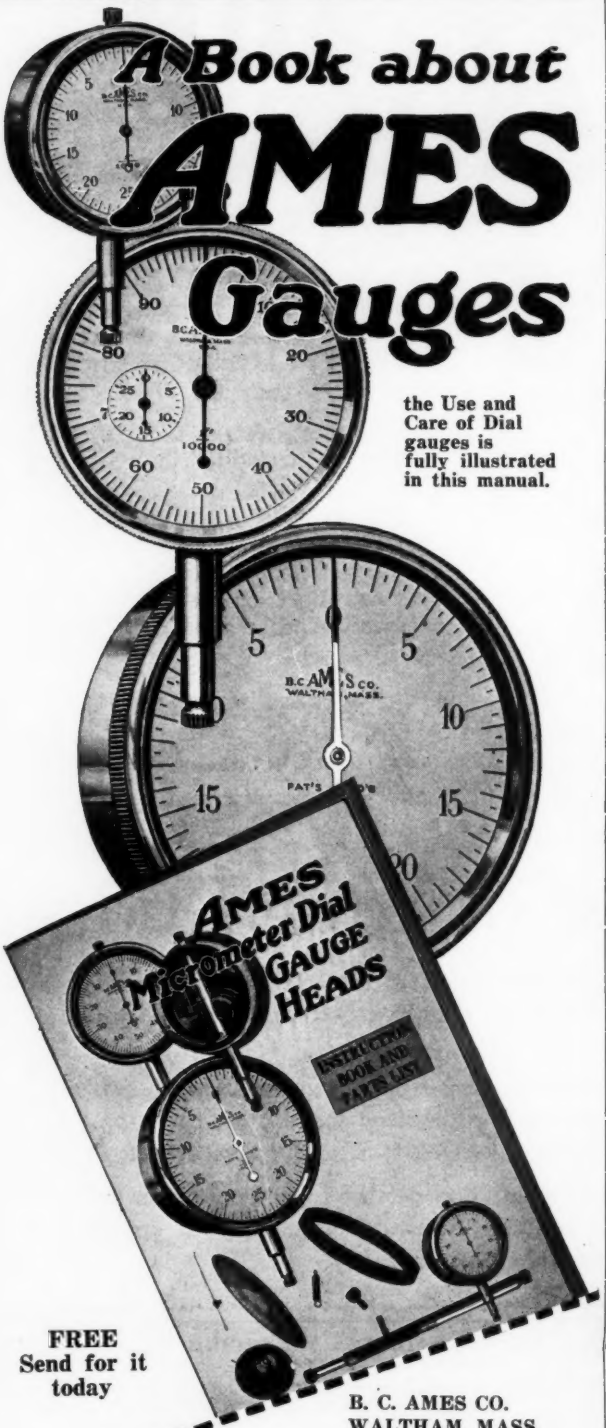
Name .....

Position .....

School .....

City and State .....

A Book about AMES Gauges



the Use and Care of Dial gauges is fully illustrated in this manual.

FREE
Send for it today

B. C. AMES CO.
WALTHAM, MASS.

Please send me a free copy of the DIAL GAUGE INSTRUCTION BOOK

Name .....

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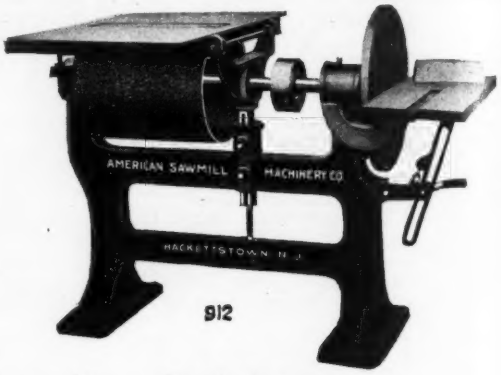
I. A. 8



For fine finishing— this SANDER

Here is a combined drum and disc Sander, specially designed for sanding flat or bent work on the drum and for general disc sanding.

This is not a machine made for manual training only, or to sell at a price. It is a practical machine for practical shop work. Like the "American" Saw Bench, Lathe, Woodworkers and Band Saw, this Sander gains the respect of students for good tools and good work.

AMERICAN
SAW MILL MACHINERY CO.

MAKERS OF WOODWORKING AND SAW MILL MACHINERY
74 MAIN ST., HACKETTSTOWN, N. J.

Always Specify Genuine
TRADE MARK
"Jorgensen"
REG U S PAT OFF
The Recognized Standard

Steel Spindles

Steel Nuts

Maple Jaws

Jorgensen
PEERLESS ADJUSTABLE STEEL JAWS

Adjustable or Nonadjustable
12 Sizes

Write for our Catalog No. 5-EE or ask your dealer.

ADJUSTABLE CLAMP CO.
424 N. Ashland Ave., Chicago, Ill.

Progressive Manual Training School is equipped with Disston Tools

View of the busy shop in the South Philadelphia High School for boys, where Disston Saws and Tools are a standard part of the equipment.

Not what it costs but how long it serves

How many years will it last, retaining its accuracy, doing good work, day after day? That is the way to judge the worth of a tool.

For instance, a Disston Back Saw. In many schools today they are in use after fifteen years of service. Still holding a keen edge, still cutting fast and true.

Those schools could have saved a little money on first cost. But they specified Disston, insisted on Disston. They wanted service . . . not for one year or two . . . but for ten or twenty.

So it is with all Disston Tools for schools. Made to last. Made to outlive ordinary tools. Eighty-six years of saw and tool making have taught us how to make tools of that kind.

So—consider cost per tool per year rather than the cost per tool, and your choice will be Disston.

Disston No. 4 Back Saw

Blade of Disston Steel, hardened and tempered to hold its edge and to cut fast. Steel back holds blade secure and gives that stiffness so necessary for careful work. Handle is carefully adjusted with blade to balance the saw so that it does not tire the hand or arm.

HENRY DISSTON & SONS, INC.,

Makers of "The Saw Most Carpenters Use"

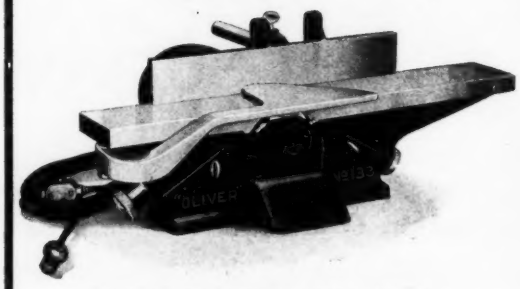
PHILADELPHIA, U. S. A.

DISSTON

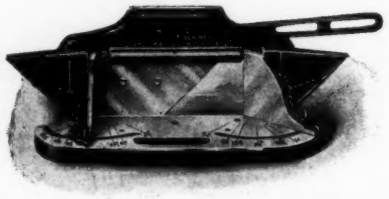
SAWS TOOLS FILES KNIVES STEEL

"Oliver"

Portables



No. 133 Hand Planer and Jointer Made in 4 and 6-inch Size.



The Wood Trimmer is hand operated and a most important tool.

You can put a Portable Sa

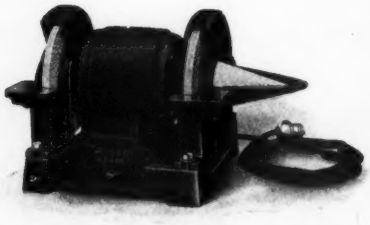
You can operate an 18-inch Band Saw from a light socket if power line is not available. You can braze a band saw by electricity with an Electric Band Saw Brazer. You can do more planing in half an hour on a 4 or 6-inch Jointer than you can in a day by hand. You can buy a Portable Disk Sander or Wood

Catalog or Circulars gladly

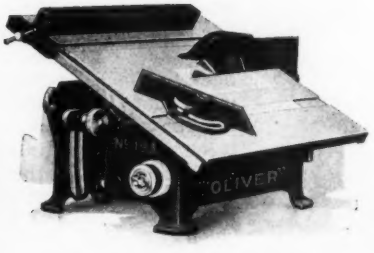
Oliver M

GRAND RAP

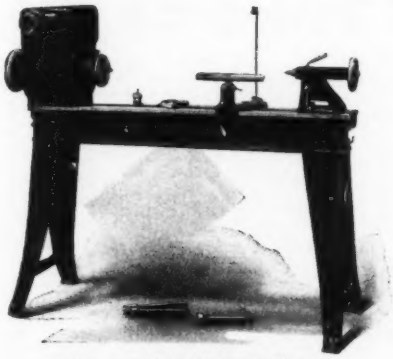
No. 585 Oilstone Tool Grinder Five Tools in One.



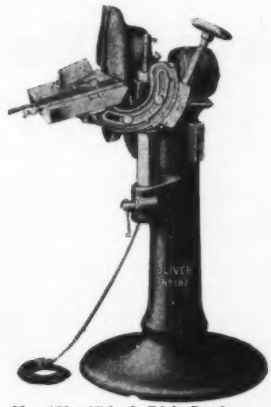
No. 485 Motor Grinder for light dry grinding.



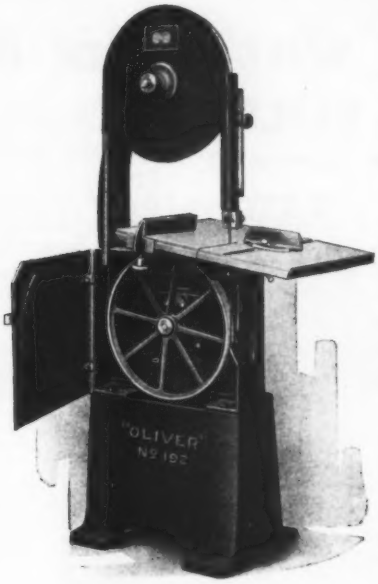
No. 193—7-inch Universal Saw Bench.



No. 51 Adjustable Speed Motor Head Speed Lathe for Alternating Current.



No. 182—15-inch Disk Sander.



No. 192—18-inch Band Saw.

Saw Bench in a small space

Trimmer even though you do not have "the price" of larger machines.

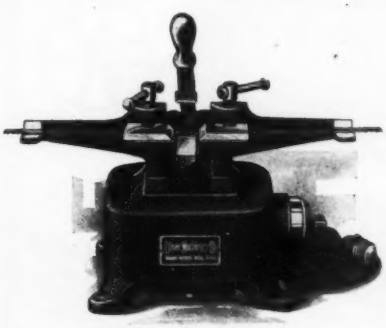
You can sharpen your plane bits and tools on an Oilstone Grinder without burning the tools. Melting or keeping glue workable is safe, convenient and economical with "Oliver" Electric Glue Heaters.

sent upon request.

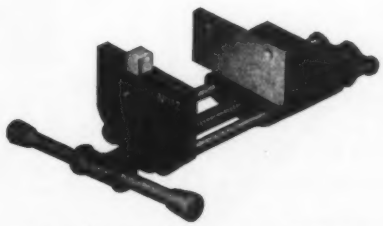
Machinery Co.

RAPIDS, MICH.

Type "C" Electric Glue Heater.



No. 462A—Electric Band Saw Brazer—very efficient.



"Oliver" Vises are made with 7-inch or 10-inch jaws.

Economic Seamless Shellac or Varnish Can $3.00

Cut Your Saw Filing Time 75%

FOLEY AUTOMATIC SAW FILER

One shop using the Foley Automatic Saw Filer recently reported doing a perfect job on a band saw in 15 minutes, that formerly required 2 hours by hand filing. It does the job with machine precision. Old saws can be easily retoothed and then kept in condition as good as new. The only machine that handles hand, back, meat, band and circular saws of 3 to 16 points to the inch—band saws ¼" to 4½"—circular saws 4" to 16".

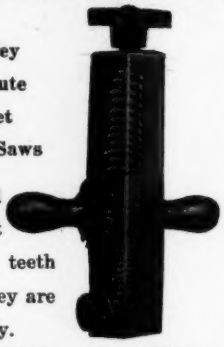
Over 100 schools and universities and thousands of contractors, carpenters, woodworking plants and professional filers consider the Foley Filer indispensable. Just a few months' use and it has paid for itself—then it goes on saving you money. Find out all about this efficient machine. Mail the coupon.

Model E-5 Power Driven Also Hand Driven Models.

$10 BRINGS IT TO YOU

K-3 Foley One-Minute Saw Set for Band Saws

Just pull the set across the teeth once and they are set perfectly.



Foley Saw Tool Co.
MINNEAPOLIS, MINNESOTA

FOLEY SAW TOOL CO., 402 Foley Bldg., 920 East Lake St., Minneapolis, Minn.

Send complete description of the Foley Automatic Saw Filer and Saw Set and what they will do.

Name .....

Address .....

No cutting tool is better than its edge Keep the tools sharp

No. 475

PLURALITY OILSTONE TOOL GRINDER

THE most convenient, serviceable and efficient tool sharpening machine ever made.

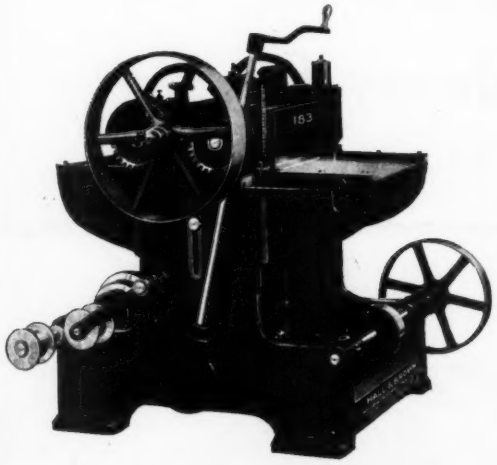
This new Tool Grinder has been carefully designed to combine many new advantages with the essential features of older models. It combines five basic units in one machine: *coarse oilstone wheel, fine oilstone wheel, grinding cone, leather stropping wheel, emery wheel,* and all accessible from two adjacent sides.

It is motor driven, ball bearing throughout, and every unit is thoroughly guarded.

Write for full descriptive bulletin.

MUMMERT-DIXON CO.
Hanover, Pa.
Originators and Pioneer Manufacturers of Oilstone Tool Grinders

DO YOUR FINISHING WITH THE No. 183 PLANER



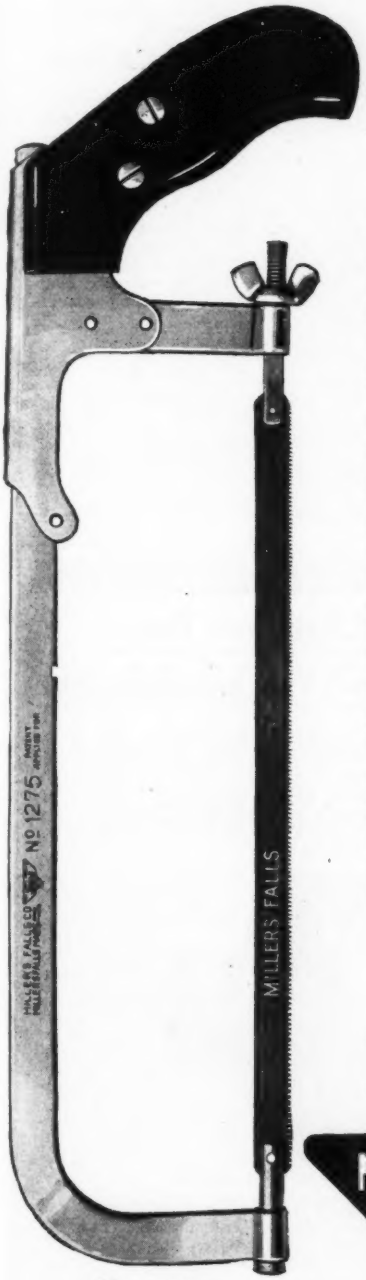
The No. 183 is a modern motorized machine with inbuilt motor mounted on the cutter head. It is also furnished with belt drive. Built in three sizes, 20, 24 and 30 inches

Complete information sent on request.

Hall & Brown Wood Working Machine Co.
Broadway, Tyler, Ninth Sts., St. Louis, U. S. A.

What is it you want in a Hack Saw Frame?

One of these will suit you!



No. 1275

No. 1275—a good, strong tool. Not made to be beautiful, but to give you faithful service. Comfortable wood handle, good "hang", simple and sturdy construction and adjustment — and a price that makes it very interesting. You can equip your training shop with these Millers Falls hack saw frames at remarkably little expense.

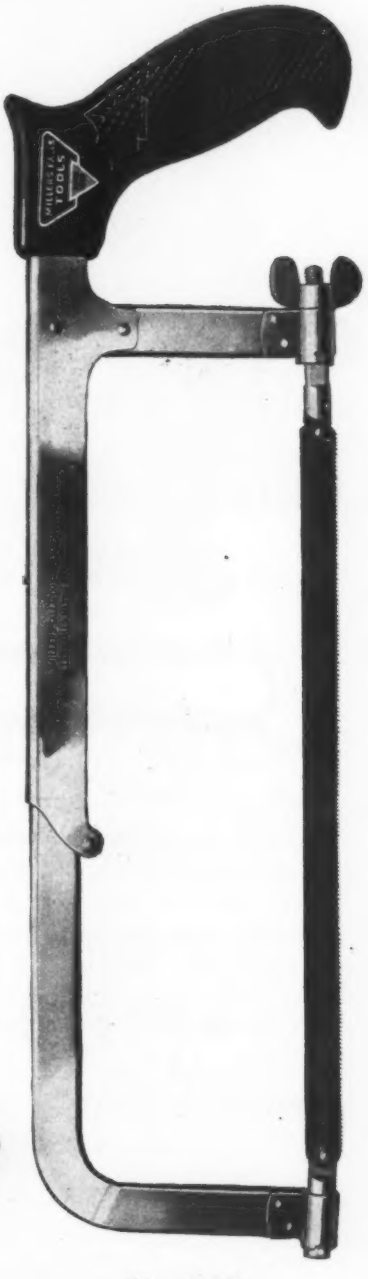
No. 1027—a frame that has been popular for years, with several recent improvements to make it even more attractive. Fine finish, exceptional strength, rapid adjustment, and perfect balance are leading features. Costs a bit more than its mate, and worth more to thousands of tool users, especially those who work hack saws hard and often.

Good values, both of them. Both are Millers Falls tools, and therefore good tools, the kind boys take pride in using. And isn't interest in their work the greatest step to proficiency?

There are many lines of Millers Falls Tools—each complete, affording you a wide range of price and purpose. Send for catalog 39.

MILLERS FALLS COMPANY
Millers Falls, Mass.
28 Warren Street, New York — **9 So. Clinton Street, Chicago**

MILLERS FALLS TOOLS
SINCE 1868



No. 1027

Best Saws for School Shops

SIMONDS

Band and Circular SAWS

It is economy to equip your machines with Simonds Saws because you get the maximum service and smooth cut lumber. Narrow Bands and Circular Saws bearing the Simonds trademark guarantee better service.

Write for catalog and prices.

Simonds Saw and Steel Co.

"The Saw Makers"

ESTABLISHED 1832 — FITCHBURG, MASS.

Chicago, Ill.
Boston, Mass.
Detroit, Mich.
New York City
New Orleans, La.
Lockport, N. Y.
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Memphis, Tenn.
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St. John, N. B.

GTD

Little Giant

Little Giant Die and Collet **SCREW PLATES**

Instruction now in the use of repair tools will stand every boy in good stead later. No matter what his future occupation, he will very likely have many chances to use this knowledge—around the house, in the garage, on the farm or in the factory.

Screw plates are indispensable where repairs are to be done that require threads. *Little Giant* Screw Plates, because of their simple design and careful manufacture, have acquired undisputed leadership in their field. Your teachers and pupils will welcome the addition of a *Little Giant* screw plate to your present shop equipment.

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASSACHUSETTS

School Representatives

R. A. FIFE CORPORATION, Mamaroneck, N. Y.

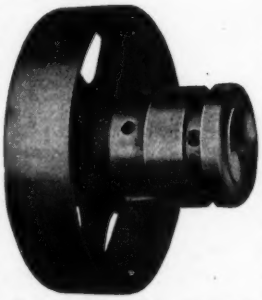
THE JOHNSON FRICTION CLUTCH

Johnson Clutches Busy In New York's Schools

New York and Brooklyn schools can hardly get JOHNSONS fast enough to meet requirements. JOHNSONS are designated by name in the school specifications. The best in everything is none too good for New York—NOR FOR YOUR SCHOOL EITHER!

The official specifications for the James Monroe High School, New York, and the James Madison High School, Brooklyn, read:

(b) The very highest grade of Friction Driving Clutches of the CARLYLE JOHNSON CO. or other equal, will be approved.



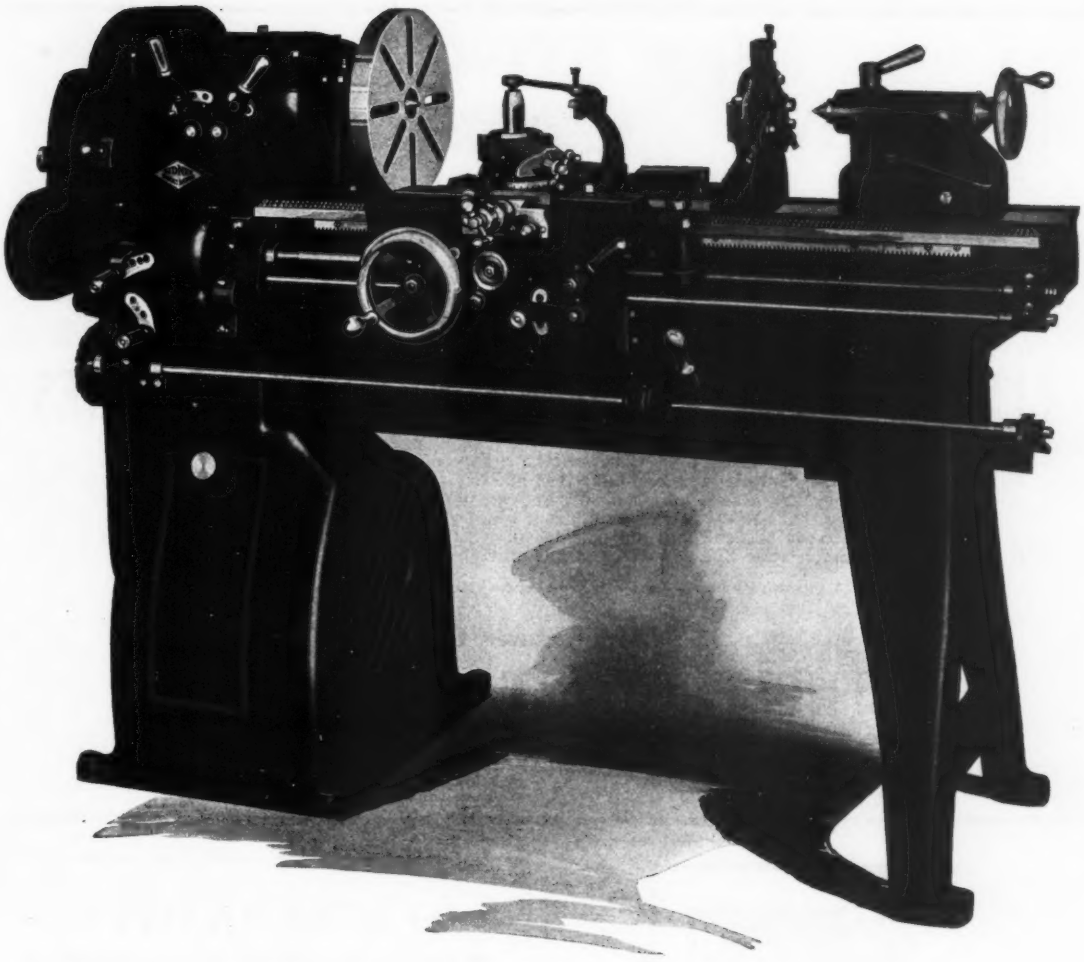
Single Clutch, Pulley Mounted

When New York school authorities decide to use JOHNSON Clutches in their manual training departments they know what they are about. Insist upon having the same advantages for YOUR children in YOUR school.

Get our complete data on JOHNSON Clutch installations on lineshafting in schools. Install JOHNSONS in your manual training departments.

Write for Catalog "I.A.M."

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER, CONN.



Several Features of this New Lathe will appeal to the Instructor

SIDNEY

12 Inch

Motor Driven

Geared Head Lathe

Motor Mounted in Cabinet Leg

In the first place there are no belts and shafting overhead to obstruct the view. The instructor can see all over the room when this type of equipment is used and is able to maintain closer supervision of all work.

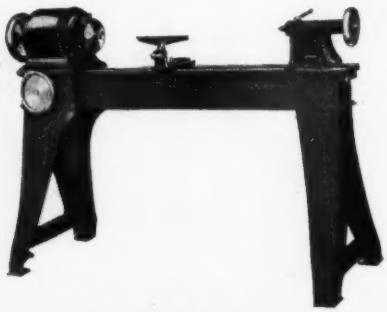
Moreover the machine may be installed in any position in the room to secure the best lighting of the work and the greatest ease and convenience in supervising the work—for the machine is a complete self-contained unit—with motor mounted out of the way in cabinet leg.

Being Sidney built—it possesses all the accuracy, ease of adjustment, safety, and long life for which Sidney Lathes have long been famous.

Ask Sidney Engineers to help you on your problems of choice of equipment and shop arrangement. This service is free. Address Dept. 408.

The Sidney Machine Tool Co., Sidney, Ohio

ECONOMICAL
EFFICIENT
SIMPLE



ACCURATE
UP-TO-DATE
SAFE

LITTLE GIANT HEADSTOCK MOTOR LATHES

Never before have all these qualities been so inherently a part of Manual Training equipment. LITTLE GIANT LATHES are Powerful, Rugged, and have that massive, vibrationless solidity that makes them ideal for accurate work. They are a self-contained unit and can be placed exactly where they are needed—and have a four speed range that always provides the exact speed needed for any project. There are no belts—governors—countershafts or belt-shifters and a child can control them as well as a grown man. The sturdy ½ H. P. ballbearing motor runs like a watch and has an unusual margin of power and safety.

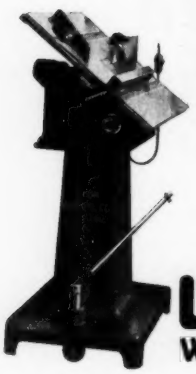
A card will bring you our new catalog and full information.

Manufactured By

LITTLE GIANT COMPANY

223 Rock St.
MANKATO, MINN.

Modern Schools Choose Union Woodworking Machines

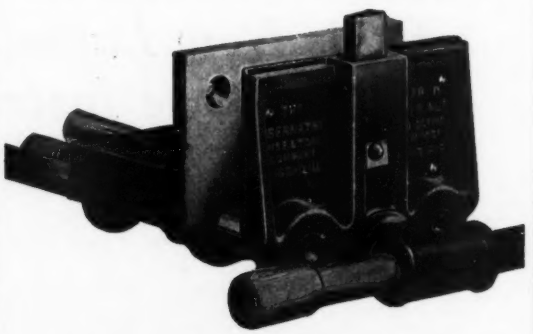


Union Woodworkers require no installation expense. They are compact and portable, accurate and finely made. Both first and upkeep costs are low, enabling you to provide a sufficient number to care for every student. Let us send you the complete catalog. Write today.

Gallmeyer & Livingston Co.
214 Straight Ave.
GRAND RAPIDS, MICH.

UNION PORTABLE AND BENCH TYPE WOOD WORKING MACHINES

— ABERNATHY — ROLLER NUT Rapid Acting VISES



give the most satisfactory service in school shops because of their Simplicity, Strength and Refinement of construction.

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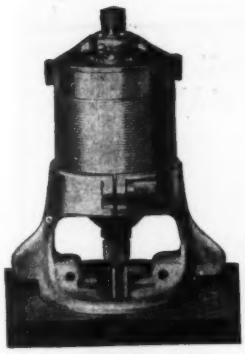

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ALL WITH ONE INEXPENSIVE Machine

SPECIFICATIONS AS FOLLOWS:

1—110 (or 220) volt 1/7H.P. Router with Template Guide and Cord..$46.50
(Runs from any lighting socket)

1—Recess and Insert Guide..... 3.00

1—Beading and Fluting Attachment 15.00

Router Bits and Beading Cutters ?

$64.50

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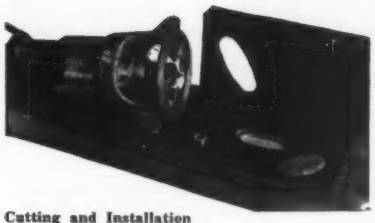


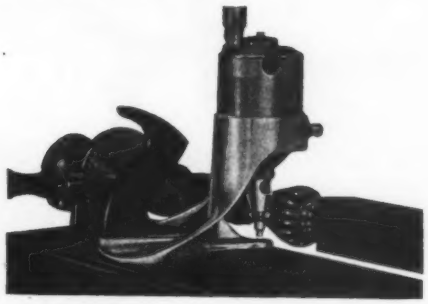
Cutting and Installation of Line and Block Inlays

CARTER MACHINES GIVE THE MOST PER DOLLAR TO THE SCHOOL, INSTRUCTOR, STUDENT AND PARENT.

And don't forget the SHAPERS

1/7 H.P. Bench Shaper Complete with everything (except cutters).....$ 54.00

1/4 H.P. Combination Shaper and Jointer Complete except cutters..... 121.00



Beading and Fluting Spindles, Etc.

TAKE THE AMATEURISHNESS OUT OF YOUR STUDENTS' WORK

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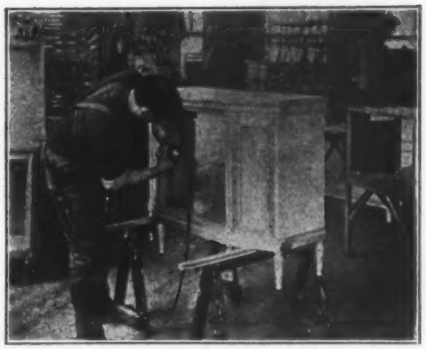
.....Name

.....School

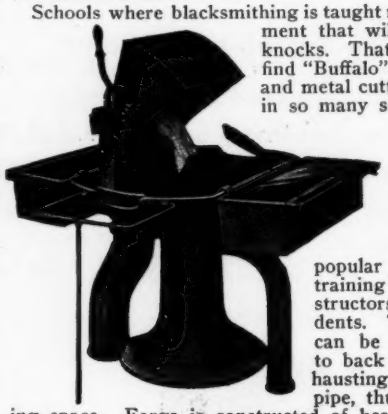
.....Town



Mortising and Constructional Operations

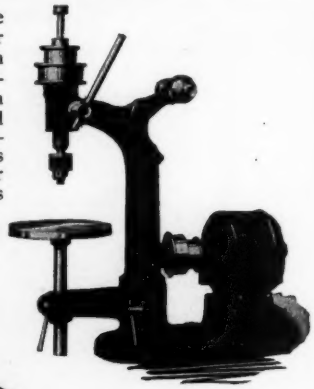
INSTRUCTORS PREFER "Buffalo" Equipment Because

Schools where blacksmithing is taught require equipment that will stand hard knocks. That's why you'll find "Buffalo" forges, drills and metal cutting machines in so many schools.



The "Buffalo" down draft forge shown here is the No. 90-D, very popular with manual training school instructors and students. These forges can be placed back to back in pairs, exhausting into a single pipe, thus economizing space. Forge is constructed of heavy cast iron throughout, and equipped with anti-clinker dumping tuyere which is controlled by a pull on the left side of forge close to the blast lever. Regularly furnished with water tank and coal box, and Buffalo Patented Down Draft Hood. Write for complete catalog.

At the right is the Buffalo 10" Junior Motor Driven Bench Drill. It has a substantial cast iron frame, finished, round table and several mechanical advantages found on no other bench drill. Motor is attached to the base as shown, and drives drill by means of a belt. Spindle speeds as high as 3000 R.P.M. if desired.



The Buffalo Armor-Plate No. 104B Combination Punch and Shear shown (left) is a very popular machine in schools doing metal work. It makes clean, accurate cuts to full capacity. Stripper prevents binding of metal. Frame of the machine is guaranteed forever. Also made in sizes 102B and 103B.

Buffalo Forge Company
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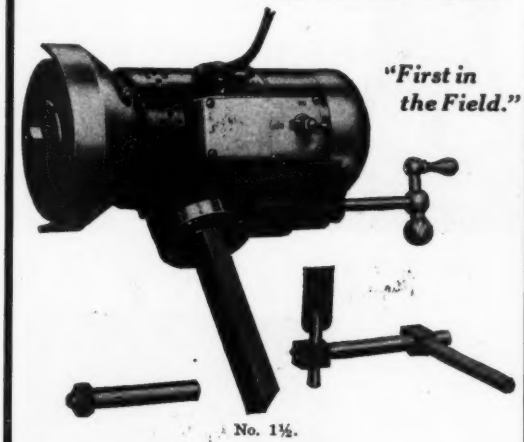
"CLARK" TOOL POST GRINDER WITH HAND FEED

"First in the Field."



No. 1½.

This machine has been designed especially for grinding lathe centers and by their use the centers can be kept in perfect order with the smallest possible loss of time. The cost of one of these center grinders will soon be saved in any shop.

Spindle made from high grade steel, accurately ground. Cut shows full swivel shank.

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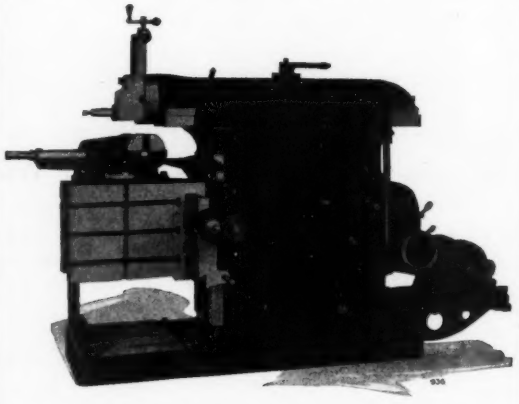
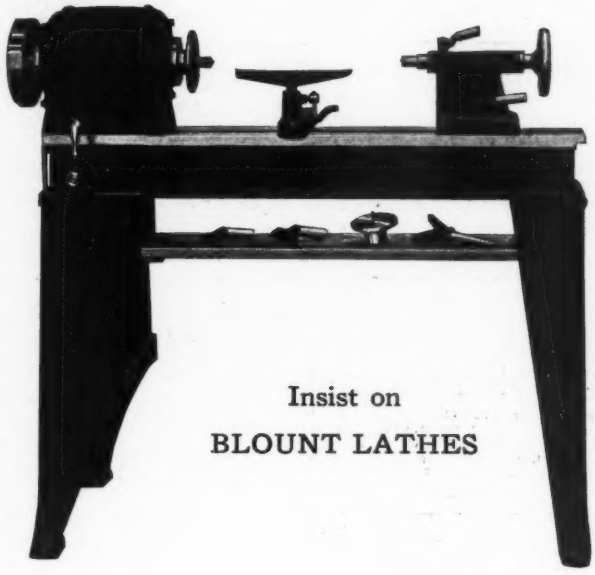
"OHIO" PLANERS and SHAPERS

Suitable for Tool Rooms, Production Shops and Vocational Schools.



The Ohio Machine Tool Co.
Planers and Shapers since 1887
— KENTON, OHIO —

BLOUNT Motor Headstock LATHES



Insist on
BLOUNT LATHES

Dependable!

The successful termination of the instructor's carefully laid plans and work schedules for the coming school year depends to a great degree on the shop equipment. The unavoidable hindrances which arise to delay the best laid instruction programs are enough without adding equipment troubles. In justice to himself and his classes the instructor should insist on dependable tools.

The long-lived, dependable service of Blount Motor Headstock Lathes is the result of close co-operation with instructors and their equipment problems, and thirty-eight years experience in lathe manufacture. Simple, sturdy, rigid, with extra large bearing capacity for all possible loads these lathes stand ever ready for service whether in elementary or advanced class work. In confidence instructors can plan their work and rest assured of maintaining schedules in shops equipped with Blount Motor Headstock Lathes. They are dependable!

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"Have proven their worth by their Service"

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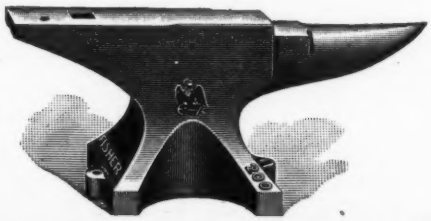
THE "EAGLE" ANVIL

The standard anvil for Schools. No deafening ring. Lessons given and heard without interference.



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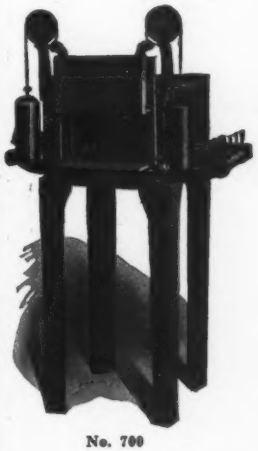

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Carbonizing Hardening and Annealing Furnace 2350° Fahr. "without a Forced Air Blast"

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An Oven Type Furnace with an extremely heavily lined firebox, 14 inches deep, 11 inches wide and 7 inches high.

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We manufacture Black Walnut and other hardwood lumber, selling direct to schools.
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Consult us regarding your requirements
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We Furnish Schools With
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THE Lumber Dealers whose advertisements appear in this Directory are specializing in lumber for woodworking departments in schools. This Directory is your buying guide for service.

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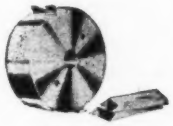
BEST QUALITY — LOWEST PRICE

Improve Your Shop Equipment

Huther Bros. Dado Head

A Huther Brothers Dado Head will speed up and simplify your intricate cutting and grooving. It consists of two outside cutters and enough inside cutters to perform the required cut. The cutters can be used in pairs or in any combinations desired.



Huther Bros. Cutter Head

Huther Brothers Round Cutter Head is especially desirable for jointing and running light mouldings on saw mandrels. The knives are set with the use of a headless set screw and flanged side plates strengthen the head and keep knives from twisting while being set.

HUTHER BROTHERS SAW MANUFACTURING COMPANY

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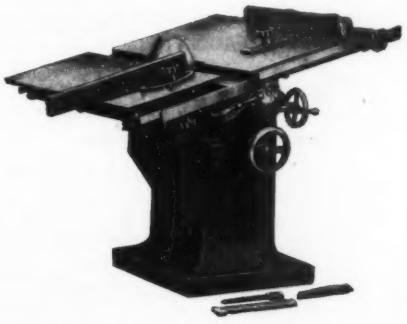
Makers of Better Saws for More Than 50 Years

Write for catalog No. 46 illustrating and describing the entire Huther Line.



The No. 10 Crescent Saw Table is a sturdy, substantial machine with every convenient adjustment for general factory work and will meet every requirement for a practical saw table with self-contained motor for your manual training department.

Send today for circular giving complete description. Also ask for circular of band saws, saw tables, shapers, jointers, variety wood workers, planers and matchers, disk grinders, cut off table, swing saws, borers, hollow chisel mortiser, tenoner, universal wood workers, self feed rip saw.

THE CRESCENT MACHINE CO.

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"It's *true* white pine"

He knows it's *true* white pine. He recognizes those old familiar qualities.

This company makes available the largest supply of *genuine white pine* to be had from any one source. Write for details on prices, facilities etc., and for copy of "Sugar Pine Facts."

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SUGAR PINE
FOR PERMANENCE
true white pine

BISON BRAND GLUE

100% Adhesiveness

A superior adhesive manufactured by the same process as Pure Food Gelatine, under ideal climatic conditions. This process, and the careful selection of raw material, yields a glue of 100% adhesive matter.

The most vital consideration in buying glue is its keeping properties. The BISON BRAND being 100% pure, its keeping properties are guaranteed.

The unusual adhesive strength and penetrating qualities make it an ideal glue for all requirements of the woodworking industry and school shops.

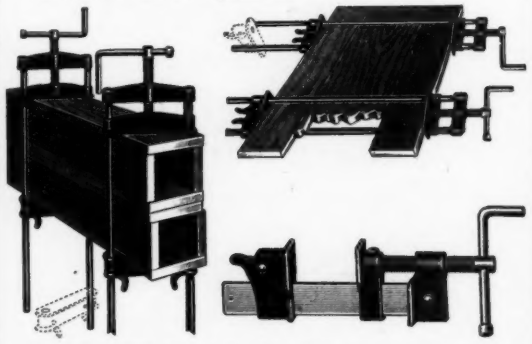
Uniformity is guaranteed.

Liberal working sample submitted upon request, in Sheet, Flake or Ground form.

HENRY WILHELM COMPANY, INC.
134-136 Tenth Street PITTSBURGH, PA.

HARTFORD SINGLE DOUBLE BAR CLAMPS

Our No. 3 Hartford Double Bar Clamps are a decided aid in class work since they eliminate the possibility of buckling. Better results are accomplished when the danger of spoiling the work is minimized. The bar on each side of the wood maintains uniform pressure.



HARTFORD No. 6 Double Bar Clamps are used extensively as presses — for veneering, gluing posts, chair arms, etc. The cost is much less and the saving worth your consideration.

Single Bar Clamps are made in Loose and Stationary Handles.

Send for Catalog No. 10, which contains complete price list on single and double bar clamps.

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308 Pearl St. Hartford, Conn.

FAIRMONT H. S. *PRAISES*

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Electric Glue Pots

March 16, 1926.

"In answer to your letter of the 9th, I am pleased to say that the Sta-Warm Electric Glue Pot has given us excellent service. It has cut our glue expense in two, and has aided materially in our work about the shop."

E. H. FUNK,
Fairmont High School, West Virginia

A Sta-Warm pot will soon pay for itself in saving of glue — you also get better work.

Write for sizes and prices.

STA-WARM ELECTRIC HEATER CORPORATION
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A SPRING TEMPER BLADE that will not break!
A Blade on which the loops will not pull out!
A POLISHED BRIGHT HIGH CARBON BLADE!

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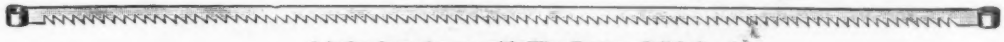
A TRIPLE DUTY BLADE; Just the Blade for Schools

The "GRIFFIN" HEAVY BENT END COPING SAW BLADE No. 14



6 inches long, for use with Wire Frames—Polished

One of these Blades will outlast many of the ordinary type of Black Blades, yet cost but little more.

Dealers will supply these Blades, or write for price to

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"GRIFFIN" FRAMES
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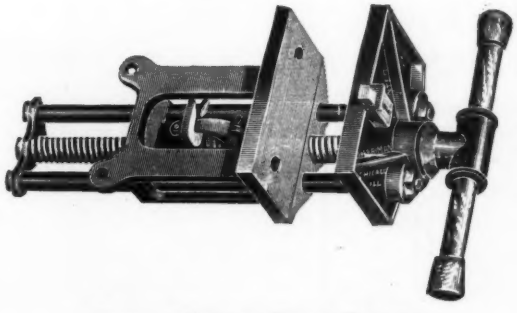
Rapid Acting, Positive,
Continuous Screw
and
Single Jaw Vises.



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and
Double Acting Jacks.

Write for Catalogue
and Price Lists

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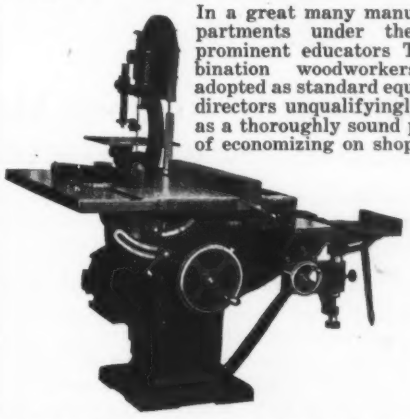
In a great many manual training departments under the direction of prominent educators Tannewitz combination woodworkers have been adopted as standard equipment. These directors unqualifyingly endorse them as a thoroughly sound practical means of economizing on shop equipment.



Saves The Cost of Several Machines

Nearly all of the sawing, planing, boring and mortising operations can be done on it just as they are done on the individual machines. It is quality built in every detail. Ball bearings equipped with Gits oilers used throughout. 2 H. P. Motor—three operators can work at it simultaneously—unhampered—safely. Completely guarded. Attachments put in motion without shifting belts.

By all means get the facts concerning this machine before equipping your new departments.

Simply ask for Bulletin E & E-2

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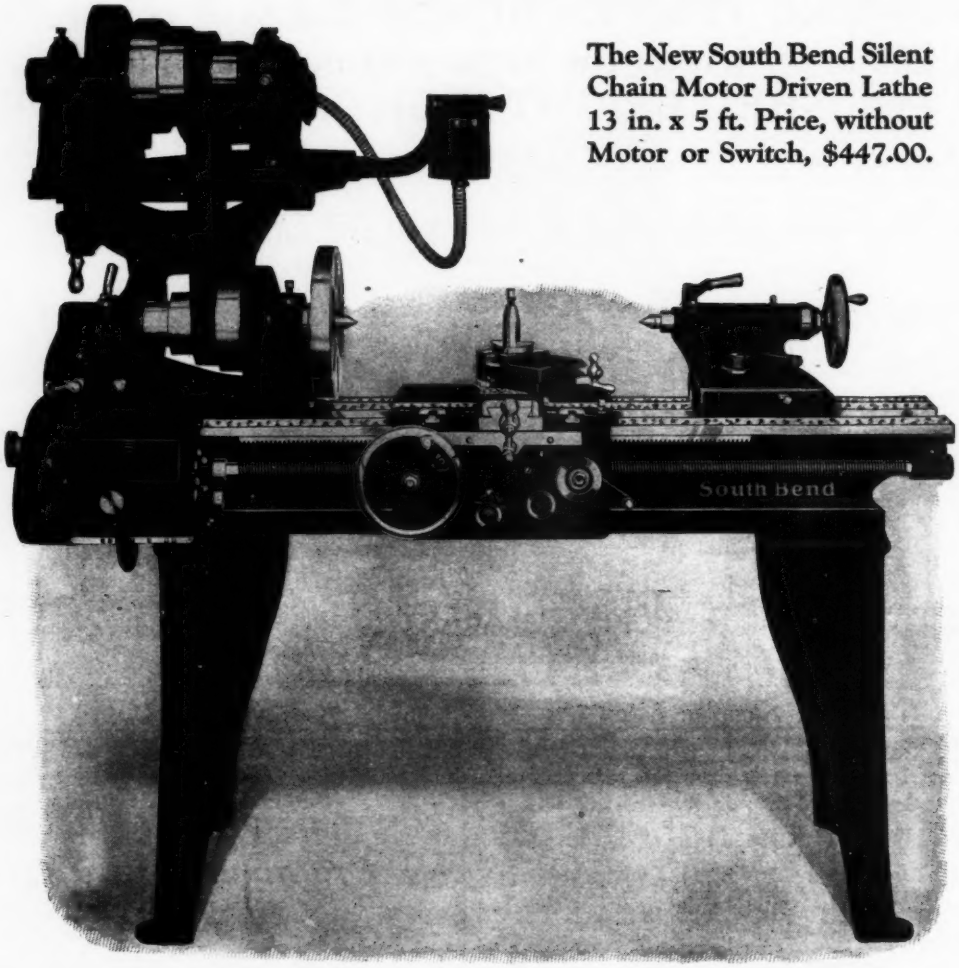


The New South Bend Silent Chain Motor Driven Lathe 13 in. x 5 ft. Price, without Motor or Switch, $447.00.

A Practical, Individual, Motor Driven Lathe for School Machine Shops

THE New South Bend Silent Chain Motor Drive Lathe is ideal for School Machine Shops. It is a complete unit in itself and requires no more floor space than a regular belt driven lathe.

The Method of Motor Drive

An Electric Motor is mounted above the lathe on a special Motor Table. A Silent Chain eliminates all noise and connects the Motor with the Drive Cone which in turn is belted to the Spindle Cone of the Lathe. A Control Switch conveniently located enables the operator to start, stop or reverse the motor from an easy working position in front of the lathe.

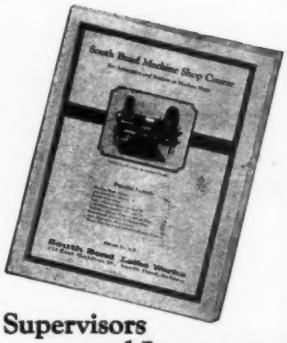
Belt Shifting Made Easy

A small Lever allows the Table on which the Drive Cone sets to tilt and relieve the belt tension for easy shifting. An independent Adjustment is also provided for taking up the stretch of the belt.

Write for Catalog No. 87 which explains this drive in detail.

South Bend Lathe Works

131 East Madison St. South Bend, Indiana



Supervisors and Instructors

Write for Bulletin No. 32-B which will be sent postpaid. Eighty practical Projects are described—48 being illustrated for convenience of the Instructor in selecting the Projects best suited to his pupils.

The New South Bend Auto-Mechanics Course Included

Many of the important jobs in the Auto-Mechanics Course are shown in a series of Bulletins which we have just prepared. Bulletin No. 32-B explains the course in detail. Don't fail to get your copy today.

Vol. XV
No. 8

INDUSTRIAL-ARTS MAGAZINE

August, 1926

Incorporating: HANDICRAFT and the ARTS AND CRAFTS MAGAZINE
Published Monthly by
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354-364 MILWAUKEE STREET
MILWAUKEE, WIS.

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STANDARD TESTS IN SHOP COURSES

The Industrial Arts Magazine presents this month an important paper on "Objective Measurements in Shop Courses" by Prof. L. Dewey Anderson of the Department of Psychology, University of Minnesota.

It is a strange anomaly that the industrial arts and vocational departments of schools deal with products and processes which are concrete and measurable, while the academic subjects deal with matters that are very difficult of measurement. In spite of these facts, the industrial arts and vocational departments are the most backward of all the school departments in setting up objective standards and in using objective measurements of their instruction.

We hope that Dr. Anderson's study will be followed by others in every shop subject, so that we shall soon have as valuable a body of objective testing material for shop work as is available in such subjects as arithmetic, writing, reading, etc.

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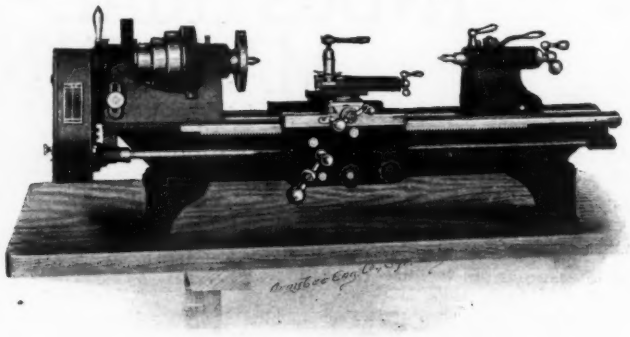
STAR LATHES

USED THE WORLD OVER



STAR LATHES

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TRAINING the BOYS for the SHOP

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THE INDUSTRIAL ARTS MAGAZINE

Volume XV AUGUST, 1926 Number 8

Objective Measurements in Shop Courses

Prof. L. Dewey Anderson, University of Minnesota, Minneapolis.

FOR some time scientists have been devising methods of measuring some of the characteristics which compose whatever we mean when we speak of the capacity to succeed, the capacity to do work, the capacity to live a normal life, and the capacity to adjust to a changing environment. Measurements of verbal intelligence and of academic achievement have been developed to a high degree of excellence. Although test technicians have concentrated their efforts in the last fifteen years chiefly on the development of measures of verbal intelligence and of academic achievement, these are only two factors in the whole scheme of an individual's adjustment to his present environment. In addition to these, there are many other measures needed for the accurate prediction of the success of an individual. Measurements of social poise, physical strength, general health, temperament and moods, character traits such as persistence and inertia, adequacy of glandular and internal secretions, psychopathies, digestion, circulation, oxidation, psychomotor functions including reaction time and sense acuity, coordination of muscle groups, sense of rhythm, athletic agility, self-sufficiency or ability to amuse oneself, were, until a few years ago, and for the most part still are, as undeveloped as measurements of intelligence were 25 years ago.

One of the most urgent needs in the educational field at the present time is for additional and improved methods of analysis and measurement of mechanical ability. The very foundations of a country's prosperity lie in its agriculture and its industries. It is, therefore, obvious that we need a good method of measuring mechanical aptitude and mechanical ability in all its phases.

Mechanical ability testing, though older in its beginnings than intelligence testing, has been almost entirely neglected until recent years. A research in mechanical ability carried on at the University of Minnesota for the last three years is one of several supported by the National Research Council in its study of the factors bearing on immigration problems. Its purpose is to devise methods of prognosticating mechanical ability, and to suggest ways and means of adapting these methods to practical use in schools and industries. The general problems outlined for study are:

1. An analysis of the constituents of mechanical ability, to determine whether it is a general ability, or a group of specific abilities; whether, in short, all intelligent people are mechanical and vice versa, or whether, on the other hand, many possessing high mechanical ability are low in intelligence and vice versa. And, are those who are good in one mechanical situation generally good in other mechanical situations or do we find many exceptions to the rule?

2. An analysis of the hereditary and environmental factors determining the existence of this ability. Is mechanical ability handed down from father to son? To what extent is the adequacy of childhood mechanical environment responsible for one's present mechanical ability?

3. The development of devices for adequately measuring success in shop courses.

4. The development of prognostic tests for predicting success in vocational shop courses.

We have constructed a battery of performance tests, for predicting success in shop courses, which will indicate probable success in shop work quite as well as intelligence tests now predict success in academic courses. However, the purpose of this paper is not to describe the predictive tests which have been developed but rather to describe the standards against which these tests have been measured and judged. Having an adequate measure of shop success, we can select from among a number of prognostic tests, given to the same boys, those tests which, with a minimum of time and expense, will best predict shop success. During the first year of the research program we used teacher's ranks as standards of shop success. These were found to be inadequate for the following reasons:

1. Shop teachers' judgments were made on entire products and not on separate well defined units of those products. Many errors of judgment result from such judging.

2. Only one teacher judged the boy's projects in each shop. The average of two or more judgments, made independently, are desirable in any measurement of success in any field.

3. The judge always knew whose project he was scoring. Favoritism, based on personality, intelligence and other factors, probably influenced the judgments.

4. There were not enough scoring units to give a fair all-round sampling of a boy's shop ability. A boy, generally good at mechanical work, will occasionally turn out a poor piece of work.

5. The scoring was highly subjective, i. e., personal opinion and all its attendant errors, rather than objective units such as inches and degrees, determined to too great an extent what score a given product received.

6. No final examinations were given.

Requirements for Good Measures of Shop Success

To overcome the faults listed above it was necessary to develop new methods for grading shop products. We wished to develop accurate, objective methods which would not involve a great expenditure of time in their administration and scoring.

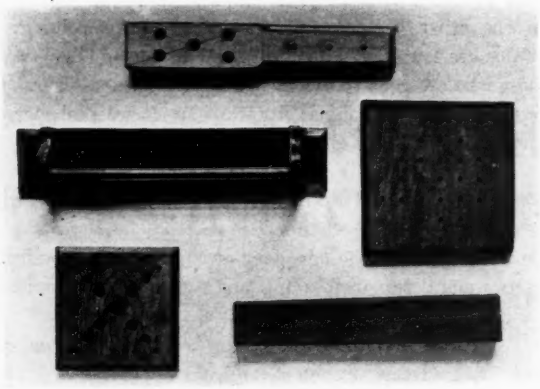


FIG. 1. WOODWORK PROJECTS.

Such measurements should be *valid*. That is, they should truly measure shop success. They should not reflect ability in handwriting, in spelling, or even in information. Hence they should be measures of shop performance.

Such measurements should have high *scoring reliability*. The score given to a boy's product by one instructor should be the same, or approximately the same, if the product is regraded by some other instructor.

Such measurements should have high *statistical reliability*. The number of shop products measured and the number of elements of a product rated, should be large enough that a rating of a boy given one week on one set of products should be the same, or approximately the same, if he were re-tested next week on an equally difficult but different set of products.

Such measurements should be objective. Whenever possible, objective units such as inches, and degrees should replace subjective opinions of judgments.

The Work Done by Boys in the Experiment

The Jordan Junior High School of Minneapolis, in which the experiments were conducted, includes in its curricula, tryout courses in five trades: Printing, sheet metal, electricity, mechanical drawing, and woodwork. A course of instruction covering a ten weeks' period in each of the above trades is given each boy. The project method of teaching is used and emphasis is laid on the acquisition of skill in using tools and materials. The boys complete a varying number of the following projects, depending on their skill in manipulating tools:

In Sheet Metal—footscraper, cookie cutter, biscuit cutter, rectangular box, dust-pan, and funnel.

In Mechanical Drawing—twelve three-view plates.

In Woodwork—rule, gameboard, and necktie rack.

Printing—composition of four passages varying in length and difficulty.

Electricity—three splices and one wiring circuit.

Illustrations of projects made in woodwork and sheet metal are shown in Figs. 1 and 2.

Shop teachers from many of the junior high schools of Minneapolis cooperated in the development of methods for measuring these projects. As a preliminary step a job analysis of the work in each shop was made.

The Measuring Instruments Constructed

The four requirements of good measurements were stated above. These require that we strive for objectivity—for the elimination of errors due to personal equations. Practical requirements demand that speed in making measurements be also attained. In satisfying these requirements two measuring machines were constructed, one to measure squareness and the other to measure dimensions. Figs. 3 and 4 are photographs of these machines.

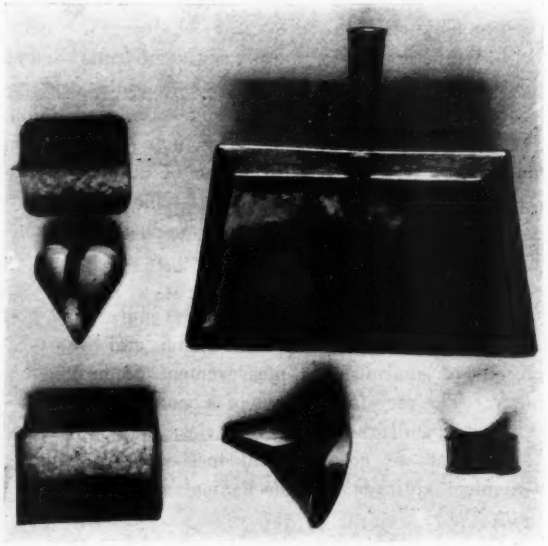


FIG. 2. SHEET METAL PROBLEMS.

Dimension Meter

The machine may be set so that if a number of identical products of many students be inserted in turn from F of the headblock and the ball at D, the pointer, B, will indicate in 32nds of an inch the amount of error, either over or under dimension, in the product. In Fig. 3, the student's block, E, being measured, is $\frac{2}{32}$nds of an inch too short.[1] The machine is readily set by in-

[1]Errors due to blocks being cut **too short** show up on the **upper** half of scale A, while errors due to blocks being cut **too long** show up on the **lower** half of the same scale.

serting the standard block, made by the instructor, between F and D, and then adjusting the head block, F, by means of screw, G, until the pointer, B, points to zero on scale A. The error in the dimension for which the machine is set, is read off and recorded for each boy's product in turn before the machine is set for a new dimension, width or thickness. In placing the object E in the machine it is necessary that the ball be placed directly at the edge to be measured and that the object rest firmly against the surface F.

Machine for Measuring Deviations from Squareness

This machine (Fig. 4) measures the deviations from perpendicularity of the ends of the blocks from the edge. (See diagram). The block E is placed in the

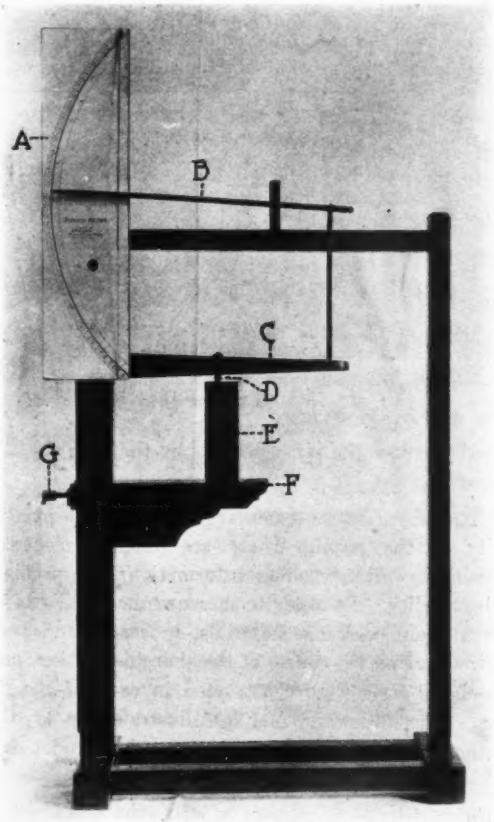


FIG. 3. DIMENSION METER.

machine so that its edge is next to the inside edge of the upright F, and so that the upper left hand corner is adjacent to the movable arm D. The arm D is depressed until it is flush with the upper end of the block E. The arm B moves in direct relation to the movable arm D and any deviation of the arm D from normal changes the dissection of arm B. The pointer at end of B registers on the scale A the amount of deviation, in degrees, which the top cut edge is from a right angle. In Fig. 4, the student's block is not square. The deviation is 3 degrees.

Machine for Measuring Wind

For measuring wind or the unevenness of a flat surface, due to warping or to uneven planing or to sanding,

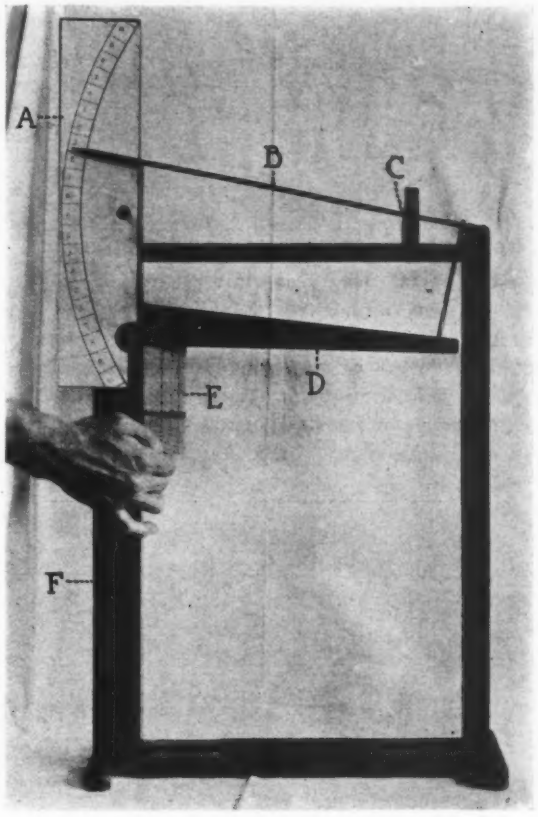


FIG. 4. SQUARENESS MACHINE.

a small triangular wedge was made (Fig. 5). The top side of the wedge is scaled to correspond to vertical distances in 32nds of an inch. In actual operation the object to be measured is placed on a flat surface, such as a table top, and the point of the wedge is inserted at the place where the space between the object and the flat surface is the greatest. The student's block, Fig. 5, is $\frac{7}{32}$nds of an inch off at A. These three devices proved very valuable in making many of the measurements in the woodwork and the sheet metal shops.

For measuring the parts of a project not measurable by these machines, and for rating qualities of a product not readily measurable in units such as inches and degrees, it was necessary to construct scales similar to those used in grading exercises in academic work such as handwriting, composition, and drawing in the academic field. In the construction of the scales, one hundred or more samples made by junior high school boys were used. From six to twelve judges ranked the samples

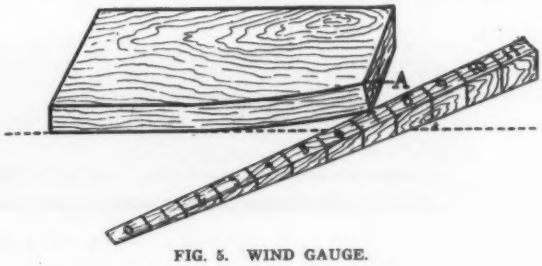


FIG. 5. WIND GAUGE.

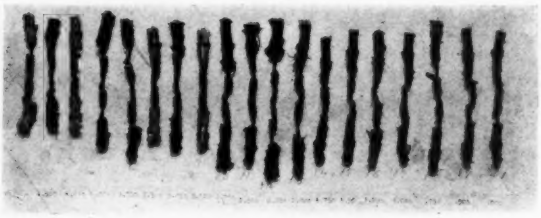


FIG. 6. RATING SCALE FOR WESTERN UNION SPLICES.

according to the quality of the work and the average rank for each sample was found. They were then arranged in order of merit according to this average ranking. Twenty or more samples were then selected for the final scale, in such a fashion that they stand for equal intervals of increasing merit from very poor to very excellent. Figs. 6 to 9 are photographs of the actual scales.

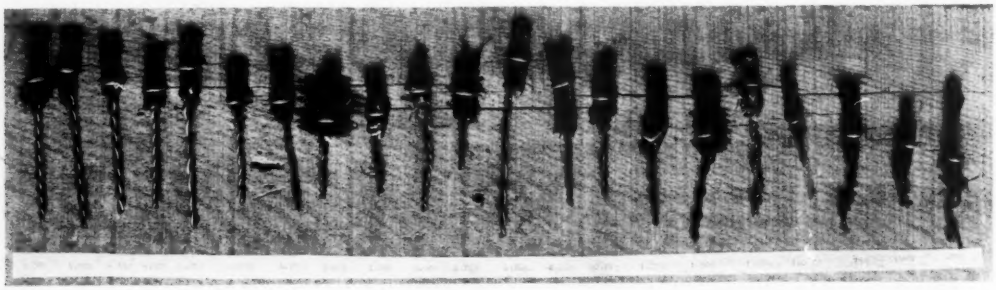


FIG. 7. SCALE FOR JUDGING QUALITY OF PIGTAIL SPLICES.

The method of using such a scale is to match the projects with the scale until a sample most like it is found in the scale. The project is then given the score which is the recorded scale value of the comparable sample on the scale.

The following rating scales were constructed:

Electricity:
1. Tap splice.
2. Western Union splice (See Fig. 6).
3. Pig tail splice (See Fig. 7).

Woodwork:
1. Boring(See Fig. 8).
2. Sawing (three scales—one of the three shown in Fig. 9).

Sheet Metal:
1. Soldering (six scales).
2. Riveting.

Mechanical Drawing:
1. Lettering (three scales).
2. Numbering.
3. Fractions.
4. Blackness of lines.

In order to make clear the variety of measures made on a project, a list of the measurements made in Project I of the Printing shop is given below:

Project I (Printing)—List of measurements to be recorded for each boy's product:

Spelling.
Transposition of letters.
Capitalization.
Punctuation.
Evenness of left margin.
Evenness of right margin.
Alignment.
Use of wrong font.
Letters up-side-down.
Clearness of impression.

There were approximately 64 measurements made on each boy's project in Sheet Metal; 200 in Woodwork; 50 in Electricity; 300 in Mechanical Drawing; and 700 in Printing. This makes a total of 1314 measurements. The amount of time necessary to grade a set of twenty woodwork or sheet metal projects by the above method is about two hours. This amount of time compares favorably with the amount of time usually taken if one carefully grades the same projects by the old subjective methods.

The above measurements gauge the manipulative ability of the pupil. There are other elements in mechanical ability, such as information, and problem-solving ability. In order to measure the pupil's information about working materials, processes, and tools, acquired during the course of the shop instruction, multiple-choice tests were constructed in each of the five shops. The following samples illustrate the type of question used. The pupil is instructed to under-score the answer which he thinks is correct.

(Electricity)—Magnetism is lost when a magnet is:
1. Placed near a dynamo. 2. Struck or jarred. 3. Covered with iron filings. 4. Used for picking up objects beyond the maximum load.

(Woodworking)—The saw used in sawing across the grain is the:
1. Rip saw. 2. Cross cut saw. 3. Coping saw. 4. Jig saw.

(Mechanical Drawing)—The part of the T-square against which you hold the pencil in drawing, is called the:
1. Head. 2. Rule. 3. Blade. 4. Scale.

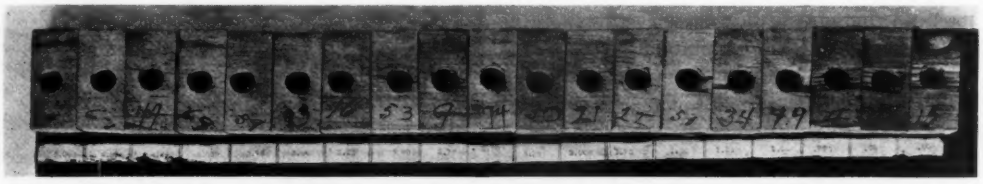


FIG. 8. SCALE FOR JUDGING QUALITY OF BORING.

FIG. 9. SCALE FOR JUDGING QUALITY OF SAWING.

(Printing)—Face, neck, shoulders, feet, body, pin mark, nicks and groove are parts of:
1. An imposing stone. 2. A type of character. 3. A platten press. 4. An ink roller.

(Sheet Metal)—Turning the edge of a piece of metal over once makes a:
1. Lock seam. 2. Lap joint. 3. Double fold. 4. Single fold.

This brief description of the measuring devices and tests developed in connection with the study on mechanical abilities indicates the practicability of using these or similar methods in the actual grading of projects in the courses when the results are not to be used for research purposes. The measurements developed for shop products are more reliable than the methods used in measuring composition exercises and are probably just as reliable as those used in measuring ability in spelling, arithmetic, and writing. Benefits to be secured in using them in the school routine are: Objectivity and reliability in the grades given; economy of time in scoring; establishment of specific aims in shopwork; stimulation of the pupil to do better work and saving of teacher's time, since the boys can grade and check their own projects.

We have thus demonstrated that it is feasible to measure shop products with as great accuracy, reliability, and objectivity as academic work. The pupil's chance of succeeding in further mechanical work is often judged from his initial success. It is therefore of the utmost importance that we use the best methods that can be devised as a basis for these judgments.

Accident Prevention
Article III—The Machine Tools

James K. Shallenberger, Brighton, Colo.

The greater part of this article is devoted to the great source of accidents in the manual training shop—the machine tools. Every machine has a score of dangers which always threaten, and nothing except a thorough course of education in these perils can justify a teacher in permitting a boy to operate a machine. It is criminal to spend a half hour in explaining to the class the many ways of misusing a machine, and the ways in which they can ruin their work; then let one rip off a hand because he has only the warning "BE CAREFUL" as a safety device. A special method in dodging danger must be applied and the chief object of this article is to offer such a method. As presented here it can be done with a class of twenty boys for seven or eight machines in the first week of school. This time is well spent if nothing else is done other than teach the boys the dangers of machine tools.

The author has no desire to dictate the method used, but in order to offer a specific approach he must give very definite directions for *some* method. The instructor is then at liberty to amplify or modify it as local conditions dictate.

The Plan

1. Divide the class into groups of not more than five students and present each group with a copy of the questions that follow. With Group No. 1 go to the machine, say the Band Saw, and taking each question in turn demonstrate the answers as suggested in the text that follows. Before attempting to make the demonstration, the instructor should carefully inspect his machines to see that all safety devices are in place and in working order. Further, he should provide himself with sample pieces carefully chosen to illustrate the dangers. Exact sizes and shapes can be determined only by the particular type of each machine. If these "samples" are at hand it will make the slow motion pantomime far more effective than a mere description of them.

Answer any questions the boys propound. When all are satisfied, dismiss them to other work and take Group No. 2 to another machine and repeat the process. Thus, one by one each group is initiated in the use of one machine, and when this order has been finished each group will have had some one machine explained to them.

2. When the above has been finished announce that you are ready to quiz any student on the machine he has learned. With his questions in hand, and at the machine, the boy answers each question in turn. If he passes a 100% examination his name is accredited on that machine. He may use that one, but he is barred from using any other until in turn he passes an examination in the same manner on a second, and so on until he is accredited operator of them all. Each in turn is given the chance to prove his fitness to work a particular machine tool. The "passing grade" must not be the conventional 75%, but a response to the examination that shows he is unquestionably prepared to operate the machine with full knowledge of the dangers to the machine and to himself. The quiz should not be offered until at least a day after the demonstration. If it fol-

lows the lecture, there is likely to be a parrot-like answer, due to immediate memory, which is not a fair test.

3. To save time and to reinforce the knowledge of each accredited boy, let the brightest act as lecturer to the others. The instructor will find a great deal of earnest discussion of the questions of the catechism if students are allowed to coach each other. The course of education and accrediting moves rapidly after one student is posted on each machine. For this reason, to accelerate the work, an effort should be made to pick for first examination one boy for each machine. After that the instructor will have little lecturing to do. Of course the essential feature is that, although the coaching may be done by students, the examinations are to be conducted only by the instructor.

4. What constitutes a satisfactory examination? Nothing but correct, definite answers to every question. Any hazy answers should be rejected without mercy. The instructor is endeavoring to prevent accidents to the boy and the machine, and any let-down in the rigidness of requirements should not be tolerated. If the student does not give a satisfactory answer to a question, it is best that the instructor does not himself give the answer but refers the boy to some accredited operator; then he may require the correct answer an hour or so afterward.

5. The desired results of this system can be attained only by rigorous enforcement of the rules. Only such as are accredited may use a machine, and to make it worth while for each boy to learn each machine one must watch for slackers and enforce strict prohibition against any non-accredited student.

General Considerations

There are a few general considerations in handling the machine hazards which may be discussed before the specific questions on individual machines are presented.

Goggles. A half dozen pairs of goggles should be in the tool room. Any board of education, that can afford several hundred dollars for machine tools, can afford the goggles. They should be available to any boy using the grinder, lathe or miller.

Defective Machine Tools. Defective machine tools are dangerous. Inspect your machinery for the following and either repair them or keep them out of commission. The following items are of common occurrence and each offers its danger:

1. Defective brazing of the band saw.
2. Stripped threads on cutter head bolts.
3. Defective lacings on high speed belts.
4. Defective clamps on saw fences, lathe tail stocks, table tilting clamps.
5. Cracked circular saws or emery wheels.

Leaving Machine. An order should be issued that, if the operator leaves a machine, the machine must be shut down. It is a temptation to go back to a bench after a rule or square and leave the machine running idle. This order should be imperative.

General Questions

The following questions are of such a character that they should be a part of the quiz on every machine. To prevent repetition they are presented here and their general aspects discussed. There are, in addition some specific considerations included under each machine.

1. Have you read the catalog description?

The object of this question is rather to help the student become familiar with different types of the same machine. In hunting for the description of the individual type in the shop he will read of others and will accumulate considerable knowledge of trade terms, sizes, designs, etc., which will make for an intelligent familiarity with shop machinery.

2. How is the machine started and stopped?

The answer to this question is usually a matter of locating and operating a switch or a belt shift, but in addition to this the boy should know the location and operation of any remote control which may be used in an emergency. If D. C. motors are used, the purpose of the starting rheostat should be explained sufficiently so the student will not run it over too fast.

3. Where is the machine oiled?

Here some sense of judgment should be shown regarding the amount of oil used. The user should distinguish between the necessity of filling oil cups and flooding a low velocity bearing, which may drip oil on the machine table or stock. He should know where to use cup grease and where the oil can.

4. What are the abuses of this machine?

Specific abuses of the several machines are taken up in detail later, but here it is worth while to notice that almost any abuse of a machine is accompanied by danger to the operator. This is especially true of the saws and the students' attention should be called to the fact. Second-hand lumber should never be run through the machine until careful inspection for nails has been made.

5. Demonstration.

Under each machine is a suggestion of what should be required. The instructor should remember that the purpose of the demonstration is not to show skill or to teach it, but merely to make sure the student has learned the simple operation of the machine with safety to it and to himself.

6. What should be done if the machine does not start at once upon closing switch, or the starting is accompanied by some unusual noise?

This question is not repeated later because all that is required is that the student must understand that the machine should be stopped at once and an investigation made.

(To be Continued)

The Garage as a Project for General Industrial Schools

Earle M. Cass, Formerly Director of the Industrial School, Waterford, N. Y.

TWO interesting and valuable building projects were worked out by the students of the General Industrial School at Waterford, New York, during the fall terms of 1924 and 1925. The projects proved to be of so much benefit to the boys of the school and were so favorably considered by the school authorities and the community that it seems worth while to write an account for the benefit of those who may be considering similar types of instruction.

Instruction in a general industrial school is intended to cover the field of the major industrial activities of the community. Up to the present time it has been generally considered that these activities may best be treated in such groups as the building trades, the metal trades, the printing trades, etc. In communities which are growing very strongly, the building trades group has seemed to be the most useful and most efficiently handled type of work. Under the head of building trades may be considered work in the construction of concrete foundations, carpentry, electrical wiring for power and lighting, plumbing for water supply and for drainage, sheet metal work for roofing and for heating and ventilation, glazing, and other activities which are involved in the construction of any building.

In the city of Waterford it has seemed that the building trades group afforded the first essential type of general industrial work which the school might undertake. In carrying out the program it was held that the controlling purpose of the general industrial school, which is to fit for useful employment, should be followed. It was recognized that a unit trade school could not be conducted but that the general industrial school should "fit for useful entrance into a general industry or trade group."

The work is divided as between practical shopwork on a productive basis and related work in the classroom. It was believed that the actual construction of buildings would afford the best opportunity for the practical shopwork. In developing the several building projects, it was found that several problems of organization and administration arose, which deserved careful consideration.

The Cost Problem

The cost of a school building project is one of the most vital problems. There are three possible methods of meeting it: 1. By constructing the building at the expense of the school, the finished product to be sold to the highest bidder. 2. By contracting to rent the building to some individual at a base rate, with the understanding that the school will assume all losses and will receive the profit, if there is any. 3. By having the prospective owner assume the expenses for the material. All of these methods are satisfactory. The first is probably the most desirable, especially when the school has sufficient space in which to construct the building. The buyer is then certain of what he is getting, without running chances of unsatisfactory work. The school, however, may become the unfortunate possessor of a perfectly good building without a buyer.

The second and third plans were used in Waterford with a great deal of success. The third was found to be best from the standpoint of instruction and absence of risk to the school. Existing conditions in each community will govern the choice of plan.

If the second or third plan is to be used, the problem of a suitable location for the building must first be considered. It is desirable, if possible, to obtain a site within a few blocks of the school shop. A location too distant is not suitable because of the loss of time in getting to and from the work, as well as the loss of energy and time in transporting materials and tools. On the other hand, if the work is too near the school, it may become a source of distraction to the students at large. Location on a main street or near certain types of buildings may also prove annoying to those in charge of construction.

When to Undertake the Work

The climate of the community has a decided effect upon successful building construction as a school project. In sections where the winter is too cold for several months to permit of outside work, the early fall is the best season. The boys will have more ambition and there will be less interference than in the spring months. An ideal situation would be that of starting the work after the school year is well under way so that the main construction is done in the months of November and December. This would allow ample time to thoroughly plan and study the job. At any time of the year the work must not cover too long a period. Interest and zeal diminish with time and any job lasting through five school weeks is probably sufficiently long for efficient work from boys.

The care of tools and materials is very important. A suitable place for the storage of both must be provided before work can begin. It is best to arrange a toolroom checking system on the job. When the tools cannot be taken to the school at the close of the day, some individual should be held responsible for their care until the following day.

Too much emphasis cannot be placed on the matter of eliminating waste. Boys become very enthusiastic about their work and in their enthusiasm to do too much work are likely, if not carefully supervised and guided, to make many mistakes. Two boys working together are less likely to go astray than when each is alone. Since even the best of workmen lose tools and spoil some materials, small errors and losses should not be taken too seriously.

One of the most essential problems is that of producing satisfactory workmanship. The prospective owner who is investing his money expects to receive full value for his investment. The finished product must meet three requirements: It must satisfy the building codes of the community; it necessarily should satisfy the terms of the contract and it is essential that it be a building of good appearance.

Forstalling Objections

Supervisors and instructors who are attempting construction projects should note carefully all labor laws and regulations which might in any way interfere with the work. Measures to forestall any misunderstanding regarding accidents as well as means of handling the consequences of accidents are important. It is possible to have insurance against accident taken out by the school. Medical care, when required as the result of an accident at work for the school, should always be provided by the school.

There are objections to such work, which should be intelligently met. Organized labor is likely to mistake the true intent of the work and consider it offensive to their interests. The objection that such work will take from them an appreciable amount of work and tend to overstock the supply of labor is often offered. A second thought shows that these are frail arguments for at the very most, only one small project can be undertaken in a year by the school, and since the aim of the general industrial school is "to fit for entrance into the vocation," the objection that the students of such classes are going to be a menace to the supply of labor is of no weight. Local labor organizations are likely to look askance at school work, while higher bodies of organized labor appreciate the work as an educational value.

Traditions of school work cause some difficulty in the administration of school projects, for the majority of people do not differentiate between "industrial arts," "manual training," and "industrial training." To many, industrial work in schools means "tinker-shop" work and mostly cabinetmaking for all situations. Occasionally objections arise from individuals over the use of the school's equipment and the work of the school classes for the benefit of a few persons.

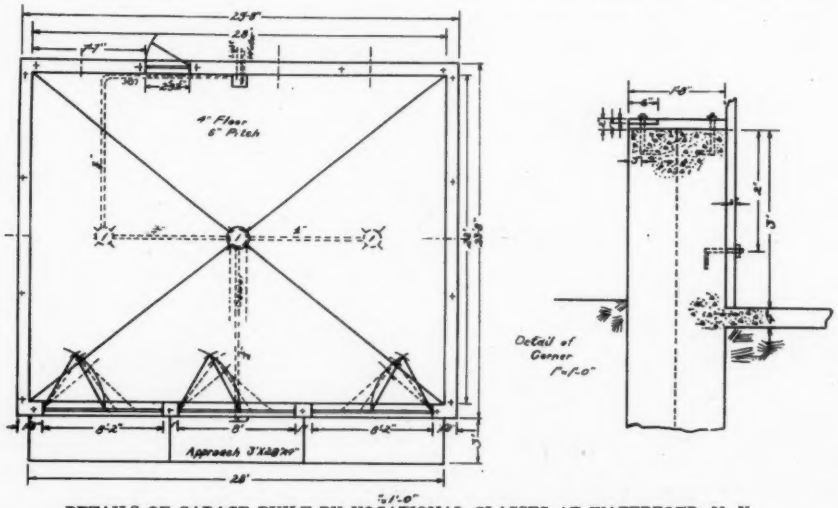
It should be remembered that when this type of building construction work is being done, the cost of pupil instruction hours is reduced. Ordinarily the cost of the shopwork falls upon the community as a whole through the taxes. However, when the work is being done for individuals who are bearing the expenses of materials, there is a marked reduction in the cost to the school. Generally speaking, those who offer objections to having the school's equipment and the work of the classes used for private individuals would not hesitate to accept the same service, if they were in a position to make use of it.

A clear and straightforward statement of the purpose and value of the work to the members of the classes and their parents lessens the probability of difficulty. Enthusiastic support can be secured from the parents and a spirit of cooperation established among the pupils. The less "advertising" outside of the members of the class and their parents the better. Too much knowledge of the work is likely to cause comment from those who are not in favor of the work. Unfavorable criticism from outsiders to the members of the classes causes an endless amount of unpleasantness to them and distasteful gossip about the school and its program.

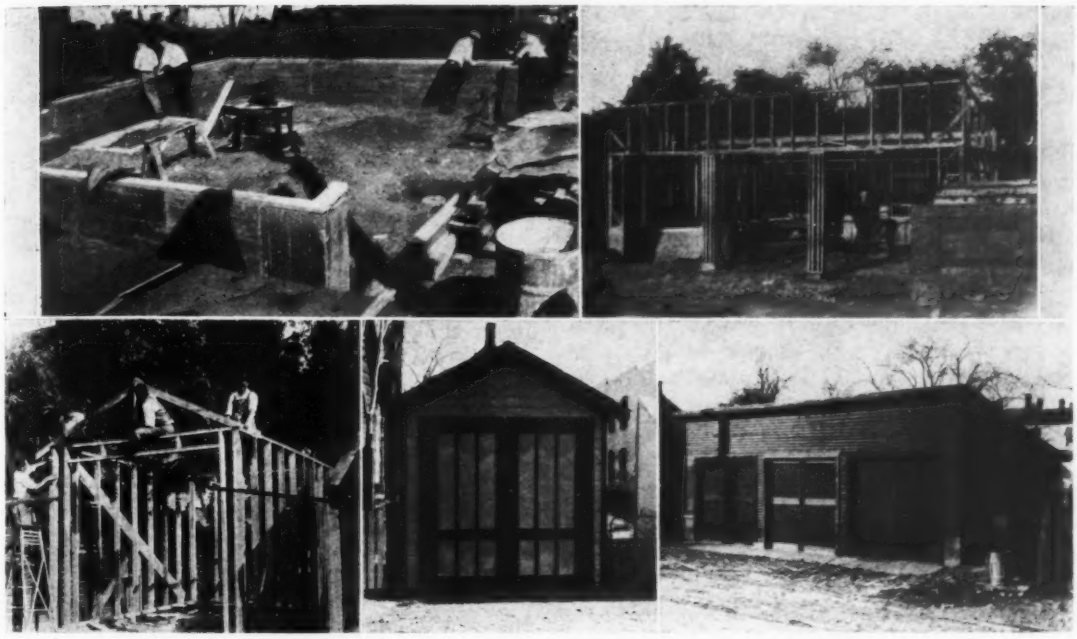
The Problems of Instruction

There are three problems of instruction which must be thoroughly understood before any work in actual construction can be started: Planning, technical knowledge of procedure, and a systematic organization of the project and of the classes.

Designing and drafting are paramount to the success of the project. The success of the building will be measured in the minds of the public largely by "how it looks and how well it will serve the purposes of the owner." It is necessary that the instructors have all of the plans worked out and every detail planned before any attempts are made to proceed. When time permits,



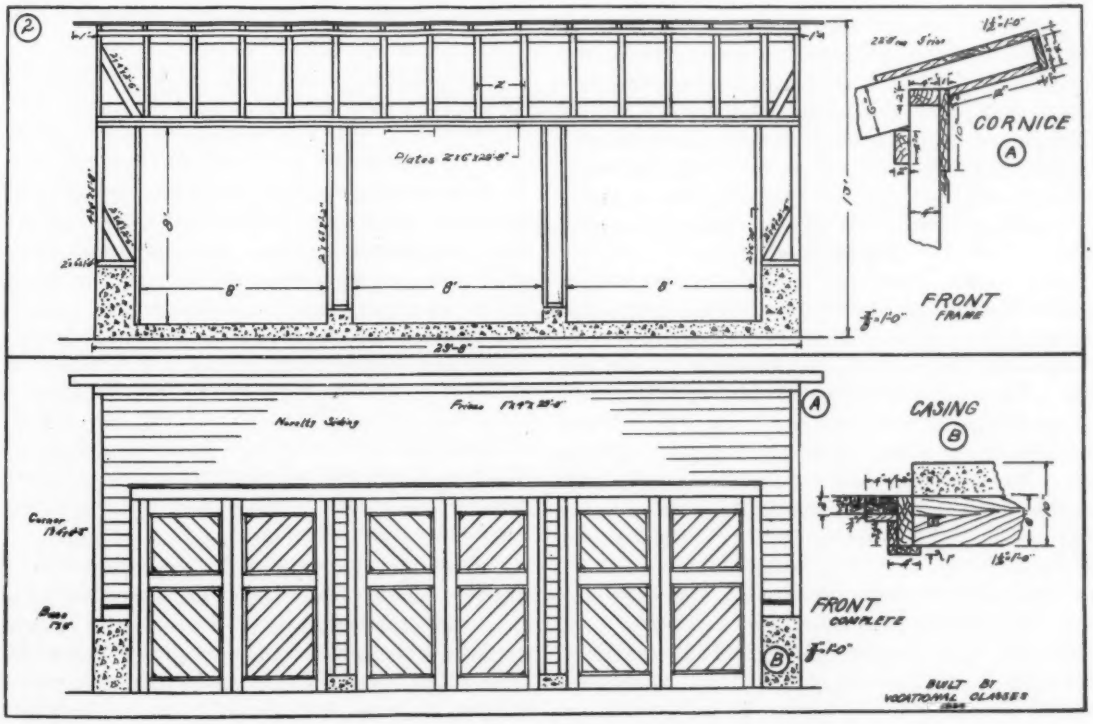
DETAILS OF GARAGE BUILT BY VOCATIONAL CLASSES AT WATERFORD, N. Y.



TWO OF THE GARAGE PROJECTS OF THE VOCATIONAL CLASSES AT WATERFORD, N. Y.

every member of the classes should plan and work out in the drafting class every detail in the building before the work commences. However, it is often the case that this cannot be done. Rough sketches worked out by the pupils to supplement the plans of the instructor will, in such case, suffice.

Careful estimates arrived at by securing prices and bids from dealers are essential to the success of the job. This involves a great deal of work for the instructors. Pupils' estimates are valuable as instructional problems, but often there is not time to work out estimates with the classes before ordering the materials. A safe and economical way of getting estimates is to place the plans with some local dealer and have him deliver the necessary materials. This plan, while having little educa-



DETAILS OF GARAGE BUILT BY VOCATIONAL CLASSES AT WATERFORD, N. Y.

tional value to the classes, is often the best means of getting quick and accurate results.

Unit Instruction Sheets Needed

There can be little success, if the pupils are placed on a job requiring a considerable amount of skill, unless they have had a thorough knowledge of the uses of tools and a complete understanding of the plans. The ease and degree of success with which the work is accomplished depends upon the ability of the pupils to follow plans and instructions.

In order to accomplish the best results, the groups who work on the job should be divided into "gangs," each with one of their number as foreman. The student foreman should be responsible for the work assigned to his group. Such an organization lessens the work and difficulties for the instructors.

The unit instruction plan is almost indispensable. The entire job should be carefully broken up into small detailed units. These units can then be given to the foremen of the student gangs. This method, although involving a great amount of work for the instructors, makes the job much easier in the long run because of the possibility of delegating work to responsible students. Another advantage of the unit plan is the assurance that everyone will be at work and have some definite job to perform. "What is everyone's business turns out to be no one's business." At the end of the day, a careful check-up of the day's work can be made. Without this or some other systematic process, the days will slide by and the instructors will be wondering what has been accomplished.

The construction of a garage comes under four more or less definite headings: (1) Surveying of the plot; (2) construction of the foundation; (3) carpentry work; and (4) the installation of plumbing, electricity, and heating. It is not advisable to attempt large foundations with pupils in school. Foundations for large projects should be let out for construction to contractors who have the tools and facilities for doing such work. The stages of construction of the building referred to in this article are shown by the accompanying photographs.

Related Work

The "related work" in a construction job may be classified as applied mathematics, science, civics, and English. The applied mathematics and science are so closely connected that there is difficulty to differentiate them. The whole matter of estimating, figuring of cost, and practical mechanics comes under this head. There are many topics under civics, which furnish valuable data. There are four main headings under which the problems in civics may be conveniently classified: (a) building codes; (b) insurance; (c) hygiene and safety; (d) health. A study of the specific building codes for the community and state can be made with profit. A study of insurance requirements is a valuable topic. Safety and hygiene are important points for consideration. The whole question of light, heat, ventilation, and the disposal of sewage forms the basis for an extensive study of health.

For English purposes, the field is almost unlimited. English instructors have excellent opportunities to secure work in report writing, compositions on the pupils' reactions to the work, criticisms, value of the work, as well as humorous and interesting sketches of the work. Such problems inject life into the ordinary routine procedure through which the boys often pass with little interest. With such work as a basis it is possible "to put a 'lot of pep' into the schoolroom work."

There are four criteria by which the success of such school work may be judged: satisfaction to the owner, reaction of the school authorities, attitudes of the members of the classes, and opportunity for future work in the same field.

As to the first of these criteria, the answers to two questions best solve the problem. Does the product of the school's efforts meet the expectations and needs of the owner when measured by the cost, time taken to construct the building, and the appearance of the completed project? Would he recommend to his friends the construction of a building by the school? The reactions of the school authorities may be tested by these queries. Are they satisfied, doubtful, or unconvinced that a building project is a worthwhile means of utilizing the school's equipment? Are they eager to have the work continue on the same basis? Four questions suggest the attitude of the members of the classes. Do the members work willingly and with enthusiasm? Are they stimulated to better efforts and achievements in all of their school work? Are they cooperative among themselves, with the program, and with the instructors? Do they meet the standards of workmanship, care, skill, and initiative to a degree comparable to the accepted standards of workmanship of the community and the school?

The opportunity for future work depends upon the success of the previous work measured by the people of the community. Do other people ask for such work to be done for themselves and friends by the school?

In conclusion the value of the project to the school and to the community should be mentioned. For the school and industrial classes, the construction problem offers a type of work which is just breaking into the light of school activities. The work is definitely objective in nature. The conception of the problem grows into a careful and detailed plan, and the plan into the actual structure of economic worth and value to the school and to the community. For the community, such a method of instruction is an inexpensive means of producing the objectives of the general industrial school. The owner gains because of the low cost of construction in securing a building to meet his needs.

Those who are interested in "live" projects and instruction believe that through this method much more can be accomplished in the public schools in industrial education than has hitherto been done. Agricultural schools have long used this type of project work; why not have the same plan followed in other schools for industrial education?

The Teaching of Related Bookwork in the Part-Time School

M. W. Muldoon, Waverly, N. Y.

IS there any difference between the teaching of related book work to the part-time student, and the teaching of other bookwork to other students? The answer to that question is *yes*—decidedly yes. Why is there a difference? Because ordinarily there is a big difference between the average part-time boy, and the average full-time day-school boy. When we say part-time boy we mean to include also the average part-time girl.

Our experience divides part-time boys roughly into three main groups. The first and smallest, which we may call the high graders, consists of those who left in the last half of the first year of high school or later. They are normal children, usually forced out by economic pressure, and furnish no new problems for the part-time teacher of bookwork, except the laying out of their individual programs. They are able to do the work assigned, and usually are willing.

A second and much larger group, we may call the low-graders. It consists of those boys who left school at sixteen, in the sixth grade or lower. This group is a problem, but not distinctly a part-time problem, as these boys are really sub-normals and must be handled by the same methods used in teaching retarded and defective children elsewhere.

Finally there is the great middle group, made up of the boys and girls who left in the seventh, eighth and ninth grades, with an occasional high type sixth-grader. These students form the bulk of the part-time class, and give rise to the greater share of the part-time problem. They are out of school in the majority of cases not because of economic necessity, but because they failed of promotion; they "hated the teacher." They disliked school and would rather work; as one of them concisely phrased it, "Because I hated them diagrams." They are a hand-minded, concrete-minded, practical minded group, interested in things and not in abstract ideas, and they have to do or see the things they are to learn. They are neither abnormal nor subnormal, but they are *different*. Those of us who are working with this group know only too well that they are not by any means what the retail garment trade calls "a perfect 36"—they are long in too many of the wrong places, and short in too many of the right ones.

Now we have this group—the law gave them to us. What are we to do with them?

In the first place we must remember that, for the past four or five years, school to them meant something to be escaped. We have to convince them that the part-time school is different from any school that they have ever attended; that it exists to help them *individually;* that school can help them on their jobs.

In short, we have to "sell" them the part-time school, and the best time to do it is the first day. That is easier said than done. How are we going to do it?

One of the first steps is to select for that day nothing but interesting, practical, useful material, and *material that will strike the boys as being practical and useful.* The next thing is to include enough technical matter to convince the class that they are going to get a certain amount of "trade stuff" even in the related bookwork. The next is to plan the work so definitely that there is not a waste minute, and to keep everybody busy all of the time. Finally, we shall try to show them definitely somewhere in each lesson just what we expect this lesson is going to do for them, and where it is used, or can be used to advantage, outside of the schoolroom.

Suppose we take a typical first day part-time class of boys who are beginning machine shop: We shall make it a point to read the registration blanks with them before having them filled in; to tell the boys that no good business man will sign any document before reading it from end to end; to discuss the advisability of telling the exact truth, especially in regard to such things as ages and dates; to discuss the responsibility of the person who signs, "I hereby certify that the above answers are correct to the best of my information and belief;" to show why no erasures should be made on any document intended for filing or for evidence. We teach them to cross out and initial the cancellation if a correction is to be made, and then ask them to fill in the blanks.

As each boy hands in his blank, we pass out for individual study typed excerpts stating the main provisions on attendance of the part-time school law. When all have registered, we discuss the excerpts item by item with the class, and then the reasons why the state has established part-time schools. Our mathematics lesson will be reading a machinist's scale—a demonstration followed by testing (measuring blocks and reading from blue printed scales). Our hygiene lesson will be "safe dress in a machine shop," based upon posters from an insurance company or the National Safety Council. Our English lesson will be an oral paragraph—a "two-minute speech"—on the hygiene topic, which may also be turned into a written paragraph if time permits, plus the beginning of a "glossary of trade terms" in our notebooks. There is nothing given during this day whose successful completion depends upon previous scholastic preparation if the boy is able to read and write and can handle simple numbers; the greater part of the work is as new to the ninth grade boy as it is to the seventh grade, and it will strike both as being practical, especially if we introduce a blueprint somewhere.

If our boys are in woodshop, we shall follow the same general plan for registration and the part-time law. Our mathematics lesson will start with the ruler and the taking of measurements, but this class does not need to

read such fine divisions as do the machine shop boys, and its lessons will probably cover also the term "over-all dimensions" and the finding of the over-all length of the first projects, either from blueprints or from sketches on the board. The class is really getting drill in addition of fractions and mixed numbers, but so camouflaged that they do not recognize it. A hygiene lesson may be "dress on the job," or possibly a demonstration of the first aid kit. English will be the study of a chisel or a nailing hammer, summarized in an oral paragraph from an outline on the blackboard, plus a few trade terms to start the trade term section of the notebook. If either of our classes have had previous shop experience, they may not need some of this preliminary material, but the average part-time class does.

Our boy from the electrical shop will follow the same general procedure; start a glossary of trade terms in the notebook; study safe dress for an electrician, noting, for instance, that where the machinist rolls his sleeves up the electrician keeps his down; learn the precautions in the use of a switchboard, or how to remove a person from a live wire; use the hygiene and safety lesson as the basis for an oral paragraph, and write the paragraph if the boy has time. If he is able to use the ruler, and has demonstrated it, the boy will calculate from the board or from a blue printed diagram the material needed for a first job, or learn how to use a wire gauge; or he will be taught how to use a catalog, and make his own estimate on the cost of a simple bill of material, looking up his own prices in the catalog furnished him.

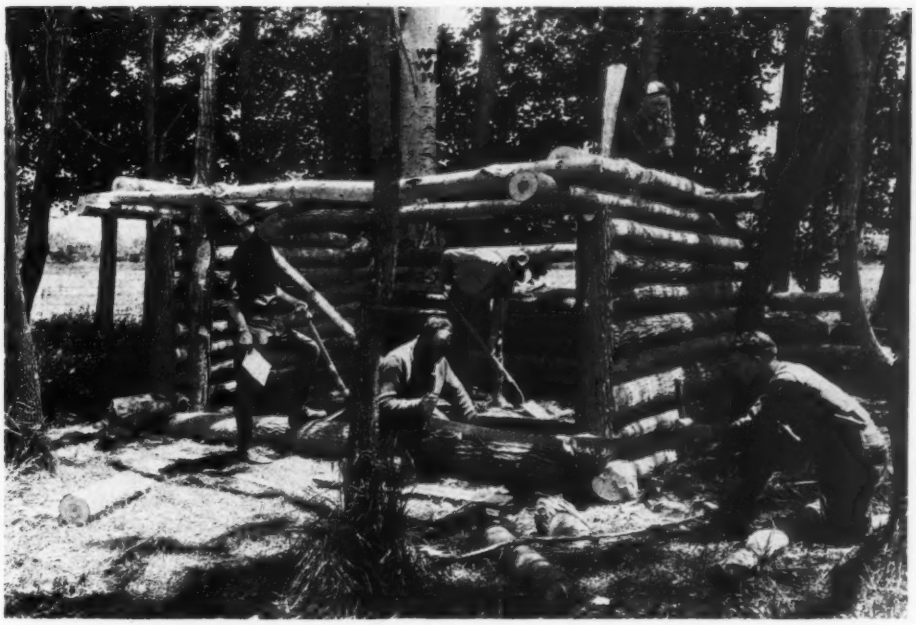
It is much easier to prevent trouble than to stop it after it starts, and if the students have the right kind of attitude at the end of the first day, many a later struggle will be prevented. The bookwork teacher in a part-time class never has much opportunity to sit down, and he will have none that first day—he needs to be "on his toes" every minute, with ears and eyes wide open. And his eyes will see the class as well as the person reciting. He will not fuss too much about "answer in complete statements" for a time. He always takes the attitude that the pupil wants to get ahead, that he is there to be helped, and that as a matter of course he is going to do the square thing. Because of this he never fixes any penalties in advance, as he never admits by his attitude the possibility of being obliged to penalize. He maintains the same courteous manner toward the boys that is expected from them. He can be stern while still remaining pleasant, and he *does not discipline in public.* In short, the good part-time teacher needs all of the qualifications of the ordinary successful teacher, plus a marked amount of some of them.

He needs vigorous health—no "nerves" but abundance of "nerve"—poise, judgment, common sense, a well-developed sense of justice and absolute impartiality, ability to put himself in the pupil's place, and alertness to a high degree. He has a strong expectation of success, resulting from a history of previous success. The part-time school is no place for failures in discipline, for inexperienced recent graduates or for people looking for an easy job. The successful part-time instructor has a strongly positive mental attitude, which never contemplates the thought of failure. His attitude says, "You *can* do this," not "I'm afraid you won't." A brisk, business-like, confident manner is one of his marked characteristics.

Part of his assurance of success comes from knowing exactly what he is going to do, and how and when he is going to do it; apart from having all of his teaching material at hand and in order. Before his class meets on that first day, there will be rulers, pens, ink, blotters, paper, registration blanks and typed excerpts for every boy, properly placed for easy handling; crayon and erasers will be distributed at the correct distances along the blackboards; his supply of pencils will be sharpened; necessary reference books, posters, and other illustrative material listed on the lesson plan will be ready. The instructor will be sure of this because he "set up lab" like a chemistry instructor the previous night before leaving the building, or else came early enough to make sure that it was completed before the class arrived.

Objection immediately arises, "our board of education furnishes neither texts nor supplies." If materials are not furnished, get them yourself for that first session, and there announce the usual local arrangement for the future. Three dozen pencils, as many penny rulers, and fifty sheets of paper are usually sufficient for any first day class; more paper will be the only thing necessary to take care of each additional class during the first week, and the entire cost for the book will not go over two dollars. The teacher who is unwilling to invest this sum to aid in his own success and give the work the right start will never make a success in any part-time school. The part-time teacher who "puts the thing across" needs a certain amount of altruism, of enthusiasm for public service, of the spirit of self-sacrifice, as well as the ability to instruct. If he does a complete job, his work will often include some of the duties of the social service workers, the parent, the kind friend, as well as those of the teacher. He must have sympathy, sincerity, tact, and genuine interest in his pupils; he needs all of the "teachers' three G's"—grace, grit, and gumption—especially gumption. If you do not really like boys and girls for their own sake, stay out of part-time school. If you aren't at least partially altruistic in your attitude—if you belong to the "I'm not paid for that" class—stay out of part-time school. For a large share of the hardest and most trying work you do, there is no tangible reward, as your final results will be tabulated only in eternity, and no standings will be posted in time to affect your salary here. If you want to help in a big job, and can get personal satisfaction out of good service, the part-time school needs you.

Editor's Note—A second paper by Mr. Muldoon will appear in an early issue.



SCOUTS BUILDING AN ADIRONDACK TYPE OF CABIN UNDER THE SUPERVISION OF L. L. MAC DONALD, NATIONAL CAMP DIRECTOR, B.S.A., AND SCOUTMASTER GEO. R. HILL, CACHE VALLEY COUNCIL, B.S.A.

"Making Things" in the Cache Valley Council, Boy Scouts of America

Solon R. Barber, Logan, Utah.

A visitor to the office of the Scout Executive of the Cache Valley (Utah) Council, Boy Scouts of America, will be struck with the amazing variety of exhibits of work done by scouts of the council as part of the regular scouting program. One will open the door to find the sad eyes of a mounted mule deer's head gazing reproachfully down upon one. A mounted owl flaps angry, but motionless, wings from one of the shelves. Piled in the corners are numerous miniature models of cabins, bridges, and birdhouses. Knot boards, made by scouts, display a variety of tied knots. The executive keeps many of his most valuable records in a filing case made by a scout in part satisfaction for the award he received of a merit badge in carpentry. Dozens of botanical and entomological mounts are also to be found in the office.

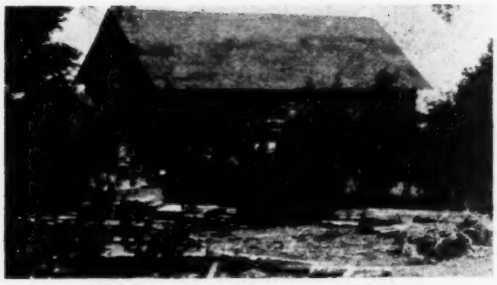
If the visitor is curious to go further in his examination of the interesting and multiple examples of scout handicrafts available in this council, Mr. Victor Lindblad, scout executive, will drive him quickly the fifteen miles up beautiful Logan canyon to the site of one of the most amazing types of scout craftsmanship of all: the huge log and cement scout camp, headquarters of council camping activities. This building, about 75′ long and 25′ wide, with two immense Rocky Mountain stone fireplaces, was built almost entirely by scouts.

A turn about the towns in the Cache Valley Council will reveal a hundred and one additional evidences of scout manual work. One of the troops in the south end of the valley has furnished its troop headquarters with willow wicker furniture made by the members of the troop. Another group of troops, in the north end this time, is building its scout camp in the form of early Utah pioneer blockhouses, a group of cabins arranged about a hollow square. Troops in other sections of the council territory are raising money by raising beans, sugar beets, wheat, and garden vegetables. Still another troop owns and operates its own truck, bought and paid for by the scouts themselves.

Detailed consideration of these things will be made later in this article.

One of the major movements in modern educational practice is moving toward a still further encouragement and development of many-sided manual and constructive abilities in boys. Scouting, always in the lead in that which is designed to raise the standard of American boyhood, is not behind in this march toward an admirable manual idea. Scout leaders have found that a boy is happier and healthier and better satisfied, if he is kept busy doing things he likes to do. Mothers early learn that their babies are easily kept happy and contented if they are given blocks to play with. The human never outgrows his desire to make things. A man tinkering with a refractory carburetor is exercising the same instinct that leads a boy to take a clock to pieces to see what makes the wheels go 'round. Manual ability should be developed since it is born of a perfectly legitimate human desire. Scouting realizes this fully.

The index of the "Handbook for Boys" issued by the Boy Scouts of America lists scores of headings referring to the craftsmanship phases of scout work. Running down the list one will find the following among many: Apparatus for wireless telegraphy, architecture, feathering the arrow, making the bow and arrow, how to make arrowheads, automobiling, aviation, safe use of the axe and knife, making and applying bandages, basketry, bed camp and how to make it, bird houses, blacksmithing, campcraft, lean-tos, other camp equipment, campfire building, knots and knot-tying, gardening, scores of games requiring manual ability, tent making, mechanics, machinery, and dozens of additional things requiring constructive



CACHE VALLEY COUNCIL SCOUT CAMP, NORTHWEST EXPOSURE, JUST AFTER THE BUILDING WAS COMPLETED, SHOWING OPEN-AIR FIREPLACE. BUILT BY SCOUTS OF THE COUNCIL.

skill. "Merit badges" for proficiency in the following crafts related to our theme, are given by the National Scout Headquarters through the many local councils: archery, architecture, art, automobiling, aviation, blacksmithing, carpentry, craftsmanship, electricity, forestry, gardening, handicrafts, leather working, machinery, masonry, mining, painting, photography, pioneering, plumbing, poultry keeping, printing, sculpture, seamanship, surveying, taxidermy, and wireless, all of which require manual dexterity of one sort or another. In order to show just how difficult the examinations for "merit badge" awards are, I quote direct from the manual the examinations for blacksmithing and forestry. The other examinations are equally broad and technical:

In order to obtain a merit badge in blacksmithing, a Scout must:

1. Make an open link of ⅜-inch stock.
2. Forge a chain hook out of ¾x½-inch soft steel, or ¾-inch round iron.
3. Make a bolt of ½-inch stock.
4. Bend and weld three links and form them into a chain, these links to be fastened to the hook of requirement 2 by a ring, and links and ring to be made of ⅜-inch round iron.
5. Make a straight lap weld of ¼x1-inch stock.
6. Make a cold chisel out of ⅝-inch hexagonal tool steel.
7. Temper a rock drill.
8. Explain how to harden and temper a cold chisel.

And for the "merit badge" in forestry, a Scout must:

1. Be able to identify twenty-five kinds of trees when in leaf, or fifteen kinds of deciduous (broad leaf) trees in Winter, and tell some of the uses of each.
2. Identify twelve kinds of shrubs.
3. Collect and identify samples of ten kinds of wood and be able to tell some of their uses.
4. Determine the height, and estimate the amount of timber, approximately, in five trees of different sizes.
5. State laws for transplanting, grafting, spraying, and protecting trees.
6. Tell what are the effects of fires on forests; what are the three general classes of fires, and how to fight each.
7. Tell how and when to collect tree seeds, how to extract seeds from cones, how to clean and store seeds, how and when to sow seeds, and how to care for seedlings and transplants, and how to set them out.

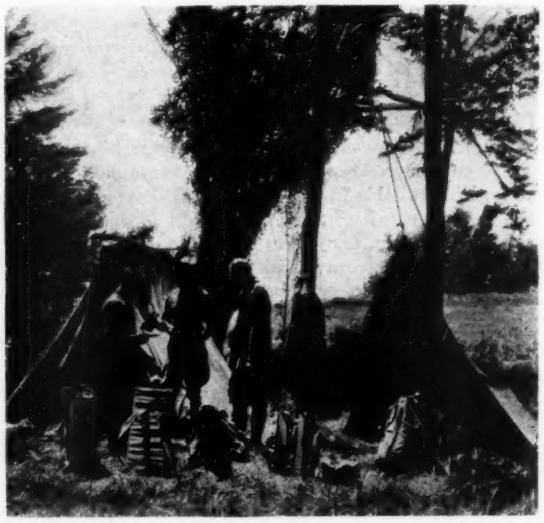
I have seen scouts with their right sleeves literally covered with the brightly-colored cloth "merit badges." The badge is correctly worn either on the right sleeve of the khaki shirt, from wrist to shoulder, or diagonally across the chest.

During the year 1924 the Cache Valley Council awarded 1,261 "merit badges" to over two hundred boys in about 75 activities, through the National Scout Headquarters. Each badge worn represents a definite achievement won with difficulty.

Without doubt the largest single project of a structural nature successfully carried out by the council scouts is the building of the scout camp in Logan canyon. In order to appreciate the magnitude of the job, one should know that the camp is fifteen miles up the canyon and about sixteen miles from the nearest city, Logan. While there is a good road through the canyon proper, from the so-called "forks," about thirteen miles up, the road was poor and had to be repaired by the scouts. Material had to be hauled at least sixteen miles, if it came from town. The building is made of cement, stone, and Douglas fir so that considerable of the materials used had to be hauled. Located on a beautiful clearing, surrounded by high cliffs and mountains, watered by a small, clear stream, the building and site present a picturesque and naturalistic appearance.

The plan was originally to have the scouts do practically all of the work on the building. This plan was carried through to the letter. Only two paid helpers were hired: The engineer who drew up the architectural plans, and a carpenter who was employed to act as foreman. One thousand scouts worked on the structure at one time or another. They were organized for the work according to troop and patrol. Each group had some definite job to do; for instance Troop 5, Logan, cut the timber for the building and built the road up to the place where timber was large enough to be of use. The boys were under the direct supervision of their scoutmasters.

The scout camp is built on a solid foundation and floor of concrete. The walls, of Douglas fir, rise about 25 feet to the square and are surmounted with a shingled roof. On the west there is a huge, double fireplace built of Rocky Mountain stone. This fireplace faces into the building and outside, as well, upon an outdoor ceremonial platform where council courts of honor are held in summer. Inside of the building, running around three sides, is a wide sleeping gallery. There are three rooms in the building, in addition to the gallery: Kitchen, provision room, and the large assembly room which is fitted up with long tables and benches made of mountain woods. One hundred and seventy-five scouts can be accommodated in comfort. But in spite of the great size and substantiality of the camp, it was built at almost no cost to the com-



DEMONSTRATION OF TYPES OF SCOUT CAMP PACKS, TENTS, ETC.

Left to right: Scout Executive Victor Lindblad, Cache Valley Council, B. S. A.; National Camp Director L. L. Mac Donald; and Scoutmaster Geo. R. Hill, Troop 5, Cache Valley Council, B. S. A.

munity. Materials such as cement, nails, shingles, hardware, were furnished out of a fund raised by popular subscription in the city. The fir were cut about five miles from the camp, in Cowley Canyon and hauled down to the site. Stone is plentiful in the neighborhood. Of course, roads had to be built and kept in repair. And it was a tremendous task to cut the timber and haul the stone. Scouts did all of this work in addition to doing most of the actual construction work on the building itself.

Eight thousand five hundred people used the camp during the season of 1924 for dozens of purposes so that the reader will see that the scout camp is a paying proposition—not financially, perhaps, for the ideal is not to make money out of the place. Upkeep, however, is moderate so that the cost of the camp is not large. Today the camp is one of the most famous of Cache Valley institutions.

From February to May, 1925, the council conducted a mammoth inter-troop scout contest. One of the main branches of the many-branched activities of this contest, was the constructive one. Awards were given to individual and troop winners in several phases of scout work. About two thousand scouts took part in the contest and the scout executive estimates that the boys made: 200 knot boards, each one having twenty knots attached, 75 miniature models of cabins and lean-tos, 140 bridge models, 100 birdhouses, 300 fire-making sets, as well as other things too numerous to mention in an article of this length. Detailed instructions for making these things will be found in the scout manual. For several weeks during the contest the scout executive's office was sadly cluttered up with models from all parts of the council. All of these show definite indications of constructive skill and patient work. They were made by boys from 12 to 18 years of age.

As I write, into the scout executive's office there bursts a young man of about 12, all out of breath. He is bursting not only into the room, but with pride as well. Going to the desk of the executive, he leans gracefully upon a pile of documents and utters words. They are to this effect: He has just completed a cabin, not a model this time, a life-sized cabin built over a stream, and he wants the executive to hasten with him at once and see if this amazing structure is well built enough to satisfy the requirements for cabin building in the examination for the "merit badge" in pioneering. This young boy's enthusiasm is a cross section of the joy of scouting. His pride is the pride of the builder in his work.

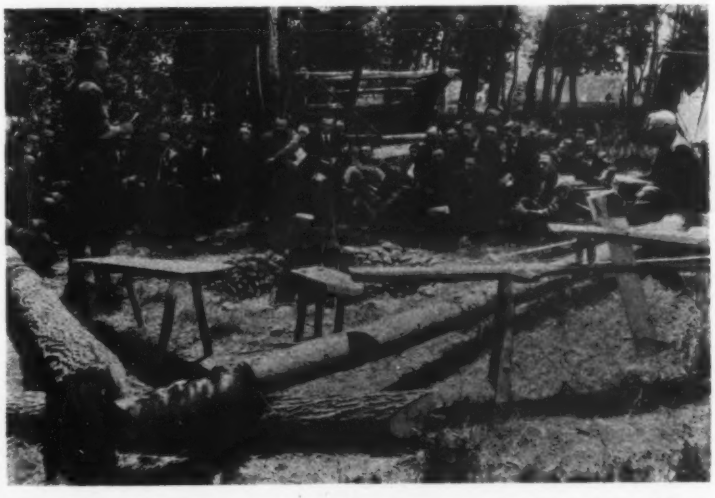
Camping brings out the constructive skill of a boy about as well as anything else. Put a boy out in the open, far from home. Have it rain. He will quickly build some sort of shelter, if the materials are at hand. But this shelter will probably leak. The boy has been taught by dire necessity which knows no law. But if he is a scout he will be ready for emergencies. He will have been taught how to arrange his camp, how to build shelters, campfires, bake ovens, sanitary appliances, before the dire need approaches. "Be prepared" is the scout motto and whether it be the making of "hunter's stew" or a troop cabin, the scout is prepared and ready to do the work. The scout is taught how to build a camp-fire, how to bake bread, as carefully as he is instructed in the intricacies of bridge building, by men who know how to do these things best. A scout must know such things before he can advance in scouting.

There are many examples of scout work showing manual ability married to a real necessity and the receiving of a valuable reward, in any scout council. Some of the articles on display in the Cache Valley Council, include mounted specimens of mule deer heads, ducks, a pine ptarmigan, an owl, a great blue heron, an avocet, a great northern loon, a canadian goose, a flying squirrel, a golden eagle, a mink, a badger, a Canadian lynx, and other animals mounted by Boy Scouts of America. Boards on which are attached examples of polished woods; botanical and zoological mounts, metal placques, examples of photography, a trophy pole are to be seen in the office testifying to the wide scope of scout manual training.

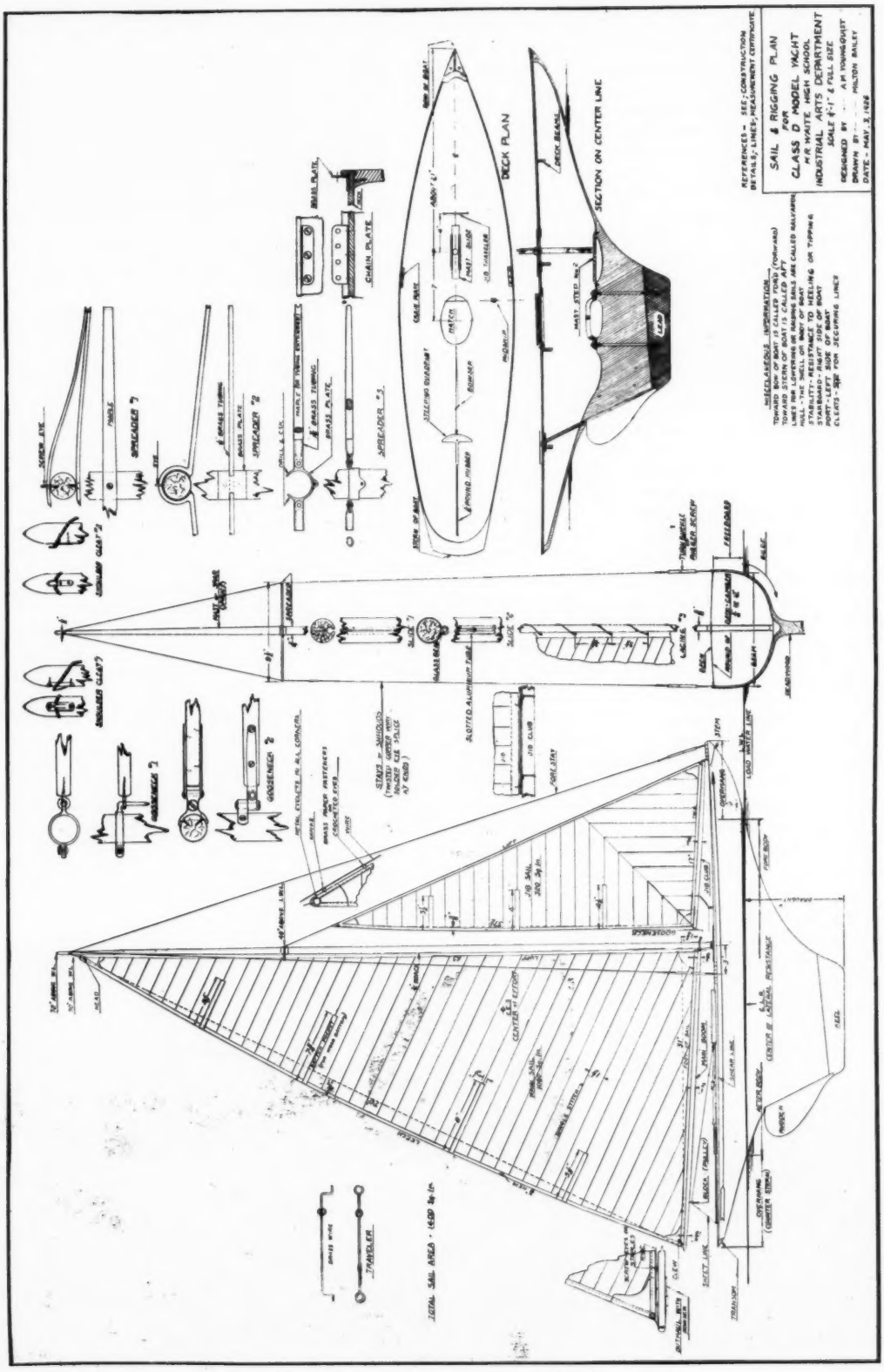
One troop in the council has provided money for the coming year by raising a garden and selling the produce. A rural troop has rented five acres this summer and is raising wheat. Another troop is raising sugar beets. Still another made one hundred and seventy-five dollars raising beans. A troop has contracted lawn mowing jobs and has made many a citizen happy by doing his grass cutting for him. All these types of work require or develop manual skill.

"I am sure that the boys in the Cache Valley Council will better an excellent constructive record in the years to come," declared Scout Executive Lindblad. "They are finding in the work that which all boys wish to find, and must find, in any activity which is to permanently appeal to them: an incentive and a reward. Personally, I consider the opportunity which scouting offers boys to use head and hand in effective coordination, one of the finest sides of a well-thought-out program. We intend to continue to feature in this council an ever-increasing breadth of program in craftsmanship."

While the scout movement is not yet old enough to have applied to it the yardstick of time as a measure of its permanent value to the youth of the world, there is no doubt of its permanent value in a manual way. Scouting vitalizes a sound system by providing suitable and desirable rewards for work well done. Such a system appeals to boys today and will continue to appeal to them to-morrow.



CEREMONIAL COUNCIL PIT, COOPER'S VISES, WASH BENCH, STOOL, ADIRONDACK-TYPE CABIN (UNDER CONSTRUCTION) BUILT BY SCOUTS DURING SCHOOL FOR SCOUTLEADERS HELD IN THE COUNCIL RECENTLY. NATIONAL CAMP DIRECTOR L. L. MAC DONALD SPEAKING.


SAIL & RIGGING PLAN
FOR
CLASS D MODEL YACHT
M.R WAITE HIGH SCHOOL
INDUSTRIAL ARTS DEPARTMENT
SCALE 4-1" & FULL SIZE
DESIGNED BY — A.P. YOUNGQUIST
DRAWN BY — HILTON BAILEY
DATE - MAY 3, 1926
DECK PLAN
SECTION ON CENTER LINE
TOTAL SAIL AREA - 1450 Sq In

DETAILS OF MODEL YACHTS BUILT AT THE WAITE HIGH SCHOOL, TOLEDO, OHIO.

Miniature Racing Yachts Built at the Waite High School, Toledo

A. M. Youngquist, Waite High School, Toledo, Ohio

MINIATURE boat sailing and racing is a sport which is rapidly coming into wide popularity. It is a sport for men as well as for boys. When skillfully handled, these little boats give the same thrills as the big boats. The list of model racing enthusiasts numbers such men as Franklin D. Roosevelt, former secretary of the navy and once candidate for vice-president, who owns a whole fleet of model yachts which he built himself. Racing clubs have been established in nearly every large city and many towns. Under the auspices of the National Model Yacht Racing Association, inter-club races are ever increasing.

Toledo has a growing model yacht club, whose membership and active participants are mostly high school boys. This was made possible by the encouragement and guidance given to miniature boat building in the department of industrial arts. To build these models accurately, as they must be built, is a severe test of shop skill and requires no little ingenuity in rigging and fitting out. The finished product represents activities in the drawing room, wood shop, pattern shop, foundry, sheet metal department, machine shop, and sewing class.

These models must not be confused with the average toy-store model as they are accurately built from designs correct in form and detail. They conform to the "universal yacht measurement rule," which is the rule for actual yacht measurement and rating. When completed, they are carefully weighed and measured, and given a class rating, which determines the class in which they will race, or their handicap or time allowance if they compete in any class other than their own. (See sample of measurement certificate.)

The racing rules, made by the national model yacht association, are quite elaborate. Each owner follows his entry around in a rowboat, and trims sail as required to go on another tack. If the pond is of suitable shape and has enough depth at the shore, the sailor may manipulate his boat from the shore.

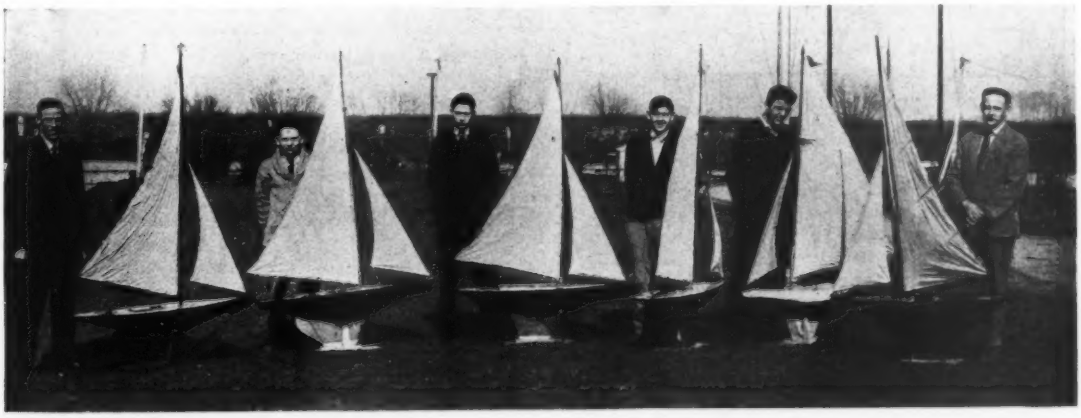
The little models can cover any kind of racing course, though the sport is at its best over a closed course, triangular or square in shape, where each boat is required to tack and round the corner bouys, bringing out the seamanship of the owner. The changes to the sails and rudder are made from the accompanying rowboat as the yacht is turned on a new course. To make them successfully, without violating any of the rules, requires practise and a skill which is one of the chief thrills of the sport.

The design developed at Waite high school is for a class D model, but also fits in the new R class on a scale of 1½" to the foot, recently recommended by the model yacht racing association for adoption. Being one of the smaller classes, it is a convenient size for transporting, and is well within the ability of the average high school boy to make. There are more boats built and more will be built in this class than the larger classes, and therefore they are in a larger competitive field. These models have proved able, seaworthy, and fast.

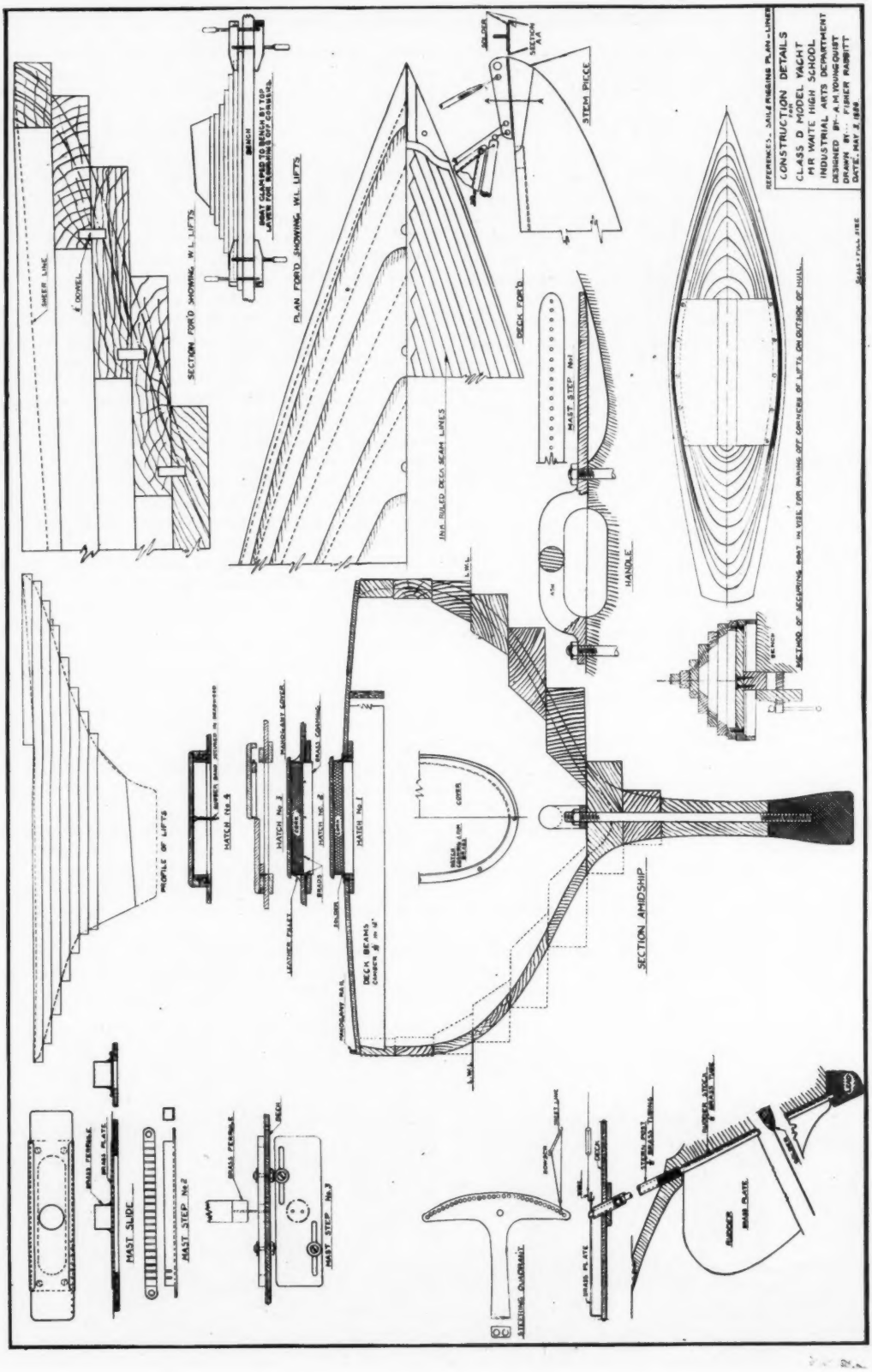
The yachts shown below are a part of the Waite "fleet" produced in the department of industrial arts. These boats are 52" long and 82" from top of mast to bottom of keel. The average cost to the boys per boat is $12. The retail price for commercial boats of this size and rating is about $200. The Waite boats compare very favorably with the commercial products. The boats are handled by an automatic steering device that operates in conjunction with the sails. The design is by the writer, who is a naval architect and instructor of drawing; the final drawings, by students in the mechanical drawing class. Paper patterns for the water planes and for the sails were made in the drawing class.

The hulls, of best grade seasoned white pine, were made in the wood shops, each water plane, or "lift," being exactly 1" thick, cut accurately to the shape of the designed water line. The termination of each lift gives the correct outline of the boat. The inside is also cut out roughly to minimize the gouging required after it is glued. A dowel at each end is necessary to fix center lines. Gluing up is a most important step and demands a careful trial clamping first. A water proof glue is used. The walls of the hull are about ¼" thick, (⅛" minimum), when completed; the deck, one-eighth of an inch. The weight of the hull without keel and fittings is between five and six pounds.

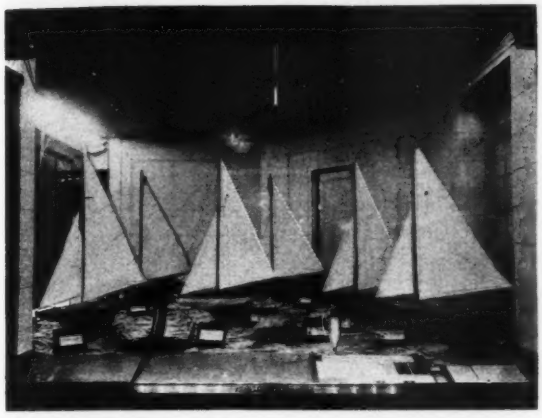
The keels, some of lead and some of copper, were molded and cast in the school foundry, and machined and tapped in the machine shop. The average weight of the metal keels is eleven and one-half pounds. The keels are bolted through the deadwood, or wood portion of keel with ¼" bolts. A handle for carrying is fitted to the bolts. Access to the handle is through a hatch in the deck. The hatch is desirable also for bailing, if necessary, and to ventilate the hull. Three types of hatch have been devel-



MODEL BOATS MADE BY STUDENTS AT THE M. R. WAITE HIGH SCHOOL, TOLEDO, OHIO, UNDER THE DIRECTION OF A. M. YOUNGQUIST.



DETAILS OF MODEL YACHT BUILT AT THE WAITE HIGH SCHOOL, TOLEDO, OHIO.



MODEL BOAT EXHIBIT AT THE M. R. WAITE HIGH SCHOOL, TOLEDO, OHIO.

oped at Waite; one with brass coaming and wood and cork cover; one with wood coaming and cover secured by a hook and elastic band; and one, a sliding wood hatch. The latter is the most difficult to make.

The finish, which is most important, affords an excellent opportunity for variety and attractive combinations of color. Some of the Waite yachts have been finished as follows:

Deck	Hull above W. L.	Below W. L.	L. W. L. Stripe
natural	natural	copper bronze	black
golden orange	golden orange	black	green
light tan	black	copper bronze	green
natural	white enamel	ocean blue	red
light tan	dark mahogany	gold bronze	sky blue
natural	dark mahogany	gold bronze	sky blue
natural	white enamel	bright red	green
natural	natural	green	black
natural	white enamel	green	red
natural	black	copper bronze	green
natural	white enamel	ocean blue	red
natural	black	green	yellow

The "Anoka" has a 1/16" black stripe on the orange hull just below the deck shear line. The "Athos" has a gold arrow stripe on the white enamel, the "Porthos," a copper bronze arrow stripe on the black, and the "Lark," a gold arrow stripe on the mahogany. The "Athos," "Lark," "Teaser," and "Aloha" have the pine deck scored, lines ¼" apart, to resemble deck seams which are filled with a black filler before varnishing. They may also be made by first varnishing the deck, using a ruling pen and black india ink to make the lines, and then applying two coats of varnish over the inked lines. A good grade of outside spar varnish must be used.

The fittings—rudder, quadrant, turnbuckles, hatch rim, mast step, mast-slide, nose piece, gooseneck, crosstrees, traveler, etc., are of brass, lacquered bright or nickel plated. Most of the fittings were made by the boys at Waite; in some cases all of them. A few were custom made in England, where model yacht building is an extensive fine art. These were used as samples. However, considerable orginiality was exercised in the making of fittings, which resulted in improvements and gives variety. There are firms in this country that manufacture and sell miniature boat fittings, but we have found our own make the most satisfactory.

The mast is so fitted as to be readily shifted an inch or two fore and aft, so that the relative position of the center of effort of sails with respect to the center of lateral resistance of the underwater portion of the hull will give the proper balance for the best sailing conditions. The mast step may be fitted on deck, but a more satisfactory method is to allow the mast to pass through the deck.

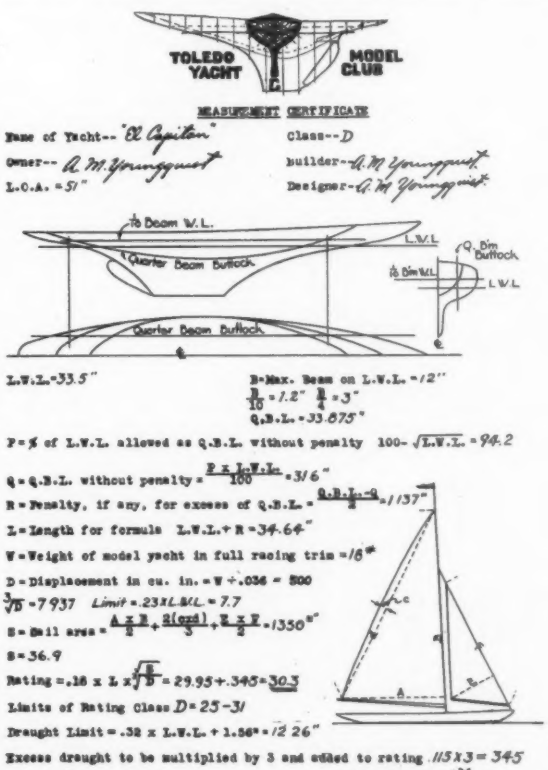
Whether they are to be used on large vessels or on miniatures, the making of sails is an art. Many novices have an idea that any piece of cloth cut the size to fit spars is a sail. In order to obtain an efficient, attractive, and proper setting sail, the material of which it is made, the way it is shaped, and the way it is secured are most important. The sails must be so shaped that when set, they will not hang as a plane surface when filled by the wind but will take the shape of the parabolic curve of a bird's wing. To secure this, a proper curve or roach is made on the luff and leech, and batten pockets for battens are sewed in along the leech.

The material used for the sails is a special lightweight Long Island cotton yacht drill. The linen of washed out tracing cloth tinted for color, Lonsdale cambric, and Union silk, a mixture of silk and cotton, are also suitable materials for miniature sails. The sails were sewed by the girls sewing class at Waite.

There are several satisfactory methods of bending or securing sails to spars. Improper bending of sails may permanently ruin the "set" of sails.

The boys are schooled in these facts, as well as in the simple technical principles of the design. Instructions in yacht handling, in the correct nautical terms and expressions, and in the rules and courtesies of yacht racing are given in the club meetings outside the regular school work.

The results attained have been most satisfactory from the construction standpoint, the interest standpoint, and club activitiy standpoint. The finished yachts being similar, a pride in the workmanship, finish, and detail of his product as compared with the others, is aroused in the boy; in fact, the crafts are highly competitive in their making as well as in their performance in racing. The making gives contact and experience with a variety of materials, tools, and processes, develops mechanical aptitude and intelligence, and broadens occupational outlook.


TOLEDO YACHT
MODEL CLUB
MEASUREMENT CERTIFICATE
Name of Yacht-- "El Capitan"
Class--D
Owner-- A. M. Youngquist
Builder--A. M. Youngquist
L.O.A. = 51"
Designer--A. M. Youngquist
½ Beam W.L.
Quarter Beam Buttock
L.W.L.
Q. Dim Buttock
½ Dim W.L.
L.W.L.=33.5"
B=Max. Beam on L.W.L. =12"
1/10 =1.2" 1/4 =3"
Q.B.L.=33.875"
P=% of L.W.L. allowed as Q.B.L. without penalty 100-√L.W.L. =94.2
Q=Q.B.L. without penalty = P x L.W.L. / 100 =3/6"
R=Penalty, if any, for excess of Q.B.L. = Q.B.L.-Q / 2 =1/37"
L=Length for formula L.W.L.+R =34.64"
W=Weight of model yacht in full racing trim =18#
D=Displacement in cu. in. =W÷.036 = 500
3/√D =7.937 Limit =.23√L.W.L. =7.7
S=Sail area = A x B/2 + 2(girth)/3 + B x F/2 =1350"
S=36.9
Rating =.18 x L x 3/√D = 29.95+.345=30.3
Limits of Rating Class D=25-31
Draught Limit =.32 x L.W.L. + 1.56" =12.26"
Excess draught to be multiplied by 3 and added to rating .115x3=.345
Date-- Jan. 1, 1926
Signed A. M. Youngquist
Official Measurer.

THE MEASUREMENT CERTIFICATE.

In addition to the constructive ability developed, the club objective is to create an interest and ability in yachting, to provide a healthy outdoor recreation, and to promote good sportmanship in competitive events.

The other high schools of the city are now beginning to build yachts of the same class from our plans. We anticipate keen school rivalry.

A display of these models in Toledo's leading department store windows in May, 1926, attracted a great deal of attention and comment, and many trophies have been given by business men for the best workmanship and finish and for winning of races. Yachtsmen of the Toledo Yacht Club have particularly encouraged these embryo yachtsmen and have invited our boys to feature their races at all major yachting events of their club. The model club hopes to develop a boat fast enough to send East to enter in the elimination races for the annual international model races with England.

Directors and teachers of industrial arts interested in organizing model yacht clubs and in building boats in school shops may obtain complete drawings and instructions of the model yachts described at a nominal cost, from the author.

Suggestions for a Vocational Course in Printing

Henry A. Breucker, Printing Trade School, Department of Vocational Education, Cincinnati, Ohio

Along the modern highway are seen the guideposts which direct the traveler. At these posts the traveler stops to see that he is on the right road. To my mind our schools are the guideposts along the highway of civilization. We should never overlook the opportunity to look and see that we are on the right road so that we may continue with confidence.

Schools of printing, properly administered, are undoubtedly coming into their own. Just a few years ago, criticism was being hurled against institutions of this character by many persons who were holding situations in the printing establishments of this country. 'Tis true that all schools may not be of the same high standard of excellence. This is true, however, of many things with which we come in contact while on our journey through life.

Many of those who formerly held opinions against these schools, are now ready and willing to admit that there is a considerable degree of merit in the instruction to be had in a well-conducted school.

If the student will do his part, he need have no fear of regrets for the time which he has put into a course of instruction. As a matter of fact, he will feel that it has been a highly profitable one. The foregoing statement can be substantiated by the fact that many persons, who received no other initial training than that to be had in schools, are now holding responsible positions in the printing industry.

No school of printing can afford to proclaim to the world that it is turning out a finished product. Giving the student a solid foundation upon which to build is the best that it can hope to do. Rome was not built in a day; neither can the printing trade be learned in a few months. Good schools of printing, however, make it possible for the conscientious, industrious student to acquire the knowledge requisite to placing him well along the road which leads to success.

Great strides have been made in the past few years to help the printing industry in obtaining apprentices and much more can be done when a careful survey is made in the various localities to determine the needs of the composing room, pressroom, bindery, etc. The school can be of real service to the employing printers, and through this secure their cooperation.

During the last 25 years the creation of specialists in the various industries has aided production; however, today we are in need of thorough mechanics who individually can handle the job from the raw material to the finished product. The same applies to the printing trade; we have compositors (hand and machine), pressmen, paper cutters, and bindery workers, each dependent upon another for the finished product.

Past experience tells us that all who enter the printing trade cannot be compositors or pressmen, and we know that some are better qualified for one position than the other. Yet there are many apprentices who will be able to master both, the composing room and the pressroom, and later qualify for positions as foremen, superintendents and managers of printing establishments.

While the school has definite programs and divides the students in different classes or groups, we should study the time required for each department to obtain the best results.

To divide the classes into four groups for the thirty hours per week allowing each class 7½ hours per week in each department will not show the same results in the classroom work. Each department, be it the composing room or pressroom or related work or machine composition or the art and design work, have their own subjects and each require various amounts of time in which the students can be brought up to the standard required.

The two years' course of printing in vocational schools, the student working part time, arranged for the first year, is as follows:

7	hours	Composition (Straight Matter)
7	hours	Press Work (Job Press Feeding, Folding, Collating and Binding)
12	hours	Related Work
3	hours	Art and Design
½	hour	Lecture on Composition
½	hour	Lecture on Press Work, Paper, etc.

Second Year.

7	hours	Composition (Job and Display)
7	hours	Press Work (Job Press Make Ready, Cylinder Feeding, Color Mixing, Paper Cutting)
9	hours	Related Work
3	hours	Art and Design
3	hours	Monotype Key Board
½	hour	Lecture on Composition
½	hour	Lecture on Press Work

This program is found to be the best for the locality where the number of students will find employment in both composing room and the press room.

When more apprentices are required in the composing room than the press room, the per cent basis should also be applied to that particular department.

It may be of educational value to teach these students the fundamentals of the monotype key board or the linotype, but the student should be proficient in hand composition before any machine instruction is given.

The best results would be obtained in the third and fourth year classes or in the evening activities, that at the present time are becoming more popular for the advancement and education of our young people.

Much can be accomplished by the student in the press room during a two-year period if ample time is given to instruction of the many phases that would make the product of the highest type. No matter how well the job was designed or how good the composition, make-up and

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TRACING SUPPLEMENT No. 29.
THE INDUSTRIAL-ARTS MAGAZINE.

TRACING SUPPLEMENT No. 29,
THE INDUSTRIAL-ARTS MAGAZINE,
AUGUST, 1926.

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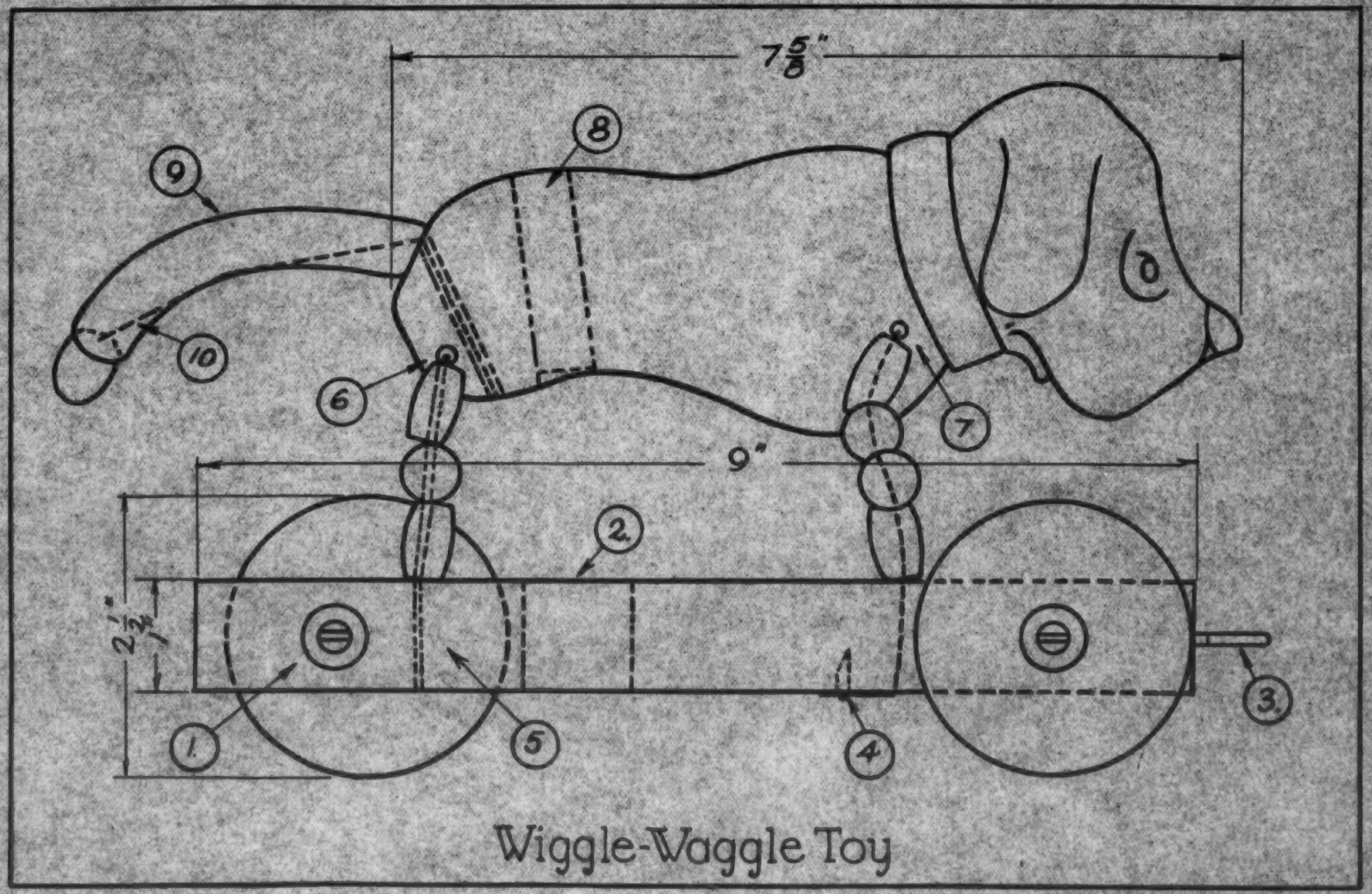

Wiggle-Waggle Toy

Drawing by Chas. Rice, Everett, Wash.

For Details see Page 289, Industrial-Arts Magazine, August, 1926.

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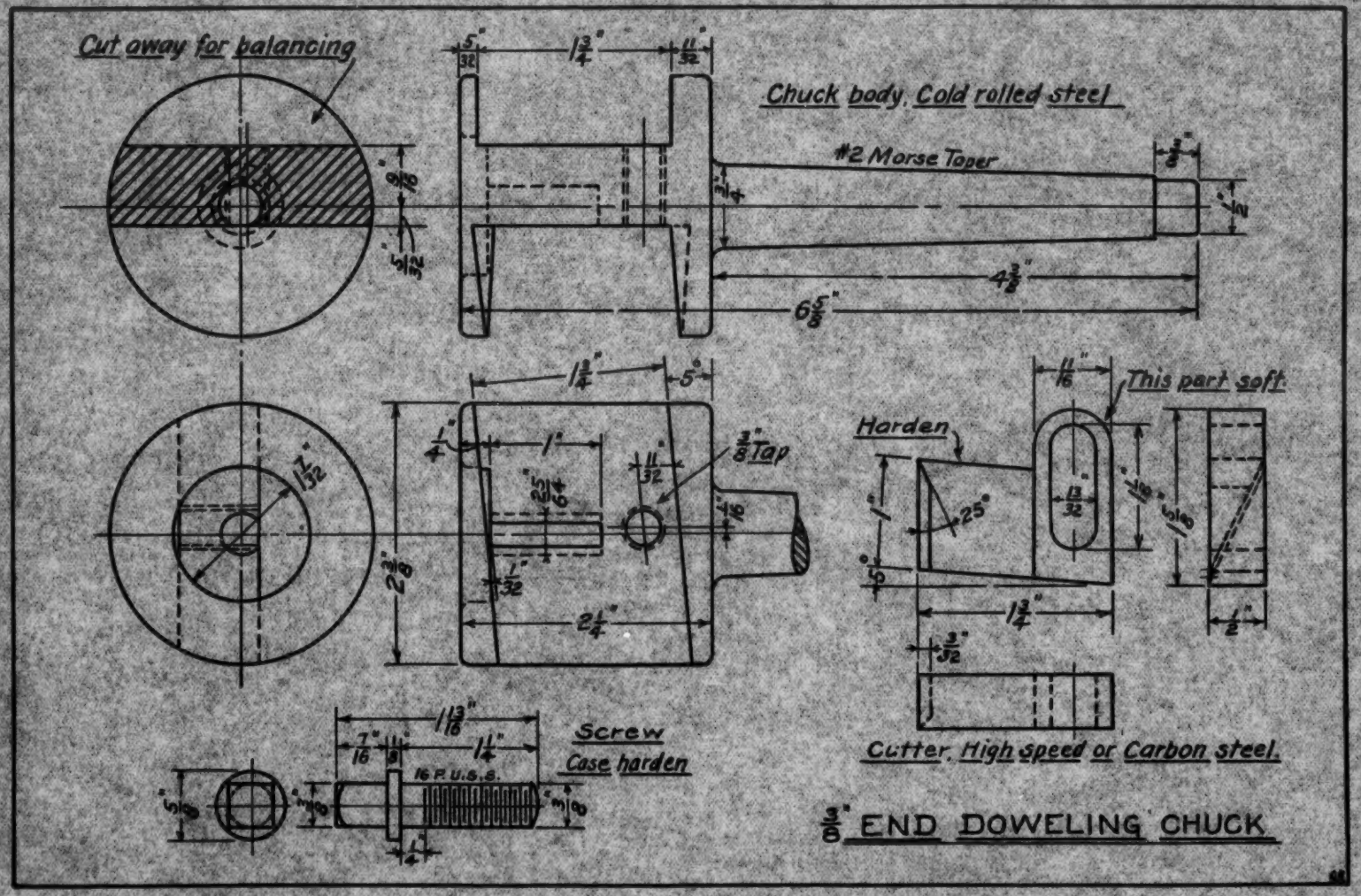

Drawing by John A. Faust, Mt. Vernon, N. Y.

For Details see Page 289, Industrial-Arts Magazine, August, 1926.

lock-up is, the work in the pressroom plays an important factor as to the beauty of the finished product.

Selection of paper, the harmony or contrasts of colors, mixing, matching and blending of colors, and make ready instruction must be given.

Course of Study

Trade-Work Composition First Year

Principles of Typesetting:
- Learning the Case and Point System.
- Using the Composing Stick.
- Uniform Spacing.
- Justification of Lines.
- Multiple Justification.
- The Use of Leaders.
- Indenting Poetry.

Style Aids in Composition:
- Punctuation.
- Using Italics.
- Division of Words.
- Indention.

Proving Composition:
- Taking Planer Proofs.
- Using Proof Press.
- Marking Proof Errors.
- Correcting Errors.

Distribution:
- Cleaning and Caring for Type.
- Distributing Type.
- Caring for Materials.

Trade-Work Composition Second Year

Book Composition:
- Initial Letters.
- Heading and Sub-Heading.
- Make-up.
- Cover and Title Page.
- Tables Without Rules.
- Tables With Rules.
- Tables for Ruled Sheets.

Display Composition:
- Selection of Type, Borders, and Ornaments.
- Type Families and Series.
- Contrast.
- Harmony.
- Proportion.
- Balance.
- Spacing.

Job Composition:
- Business Cards.
- Letterheads.
- Envelopes.
- Billheads and Statements.
- Receipts.
- Rule Forms.
- Tags and Labels.
- Handbills.
- Blotters.
- Tickets.
- Announcements.
- Window Cards.
- Invitation.
- Two-Color Forms.

Trade-Work Press Room First Year

No. 1—A. Getting acquainted with the Job Press.
B. Principles of the Printing Press.
C. Parts of the Press.

No. 2. Oiling and Cleaning.

No. 3. Feeding the Job Press.
A. Feeding Blank Stock.
B. Position of Stock.
C. Handling the Sheet.
D. Safety Precautions.

No. 4. Washing Up the Job Press.

No. 5. Grades of Paper and Inks to use on them.

No. 6. A. Sizes and Weights of Paper.
B. The Grain of Paper.
C. Care of Paper Stock.
D. Cutting Stock.

No. 7. Preparing the Tympan.

No. 8. Inking the Job Press.
A. Care of Ink.
B. Feeding Small Jobs on Job Press.

Trade-Work Press Room Second Year

No. 9. Make Ready on Job Press.
A. Placing the Form.
B. Adjusting the Grippers.
C. Pulling the Spot Sheets.
D. Setting Guides.
E. Wood Base Electrotypes.
F. Mixed Forms.

No. 10. Rollers.
A. Care of Rollers.
B. Adjustments of Rollers.

No. 11. Inks.
Mixing, Matching and Blending of Colors.

No. 12. Cylinder Press.
A. Getting acquainted with Press.
B. Oiling and Cleaning.
C. Feeding Blank Stock.
D. Feeding Live Jobs.
E. Handling Printed Stock.
F. Washing Up the Press Cylinder.
G. Adjustments of Rollers.

No. 13. Bindery.
A. Hand Folding.
B. Colating.
C. Stitching.
D. Trimming.
E. Machine Folding.

No. 14. Engravers' Tools.
A. Handling and Sharpening.
B. Tooling out Shallow Cuts and Bad Edges.

Related Subjects

The work of this department can be arranged so that all the subjects will be given in a systematic manner and followed in rotation. These lessons can be divided into 150 or more units, each unit containing from 350 to 3,500 words. They should be printed in a loose leaf form so that new lessons may be added at will. The best arrangement for these sheets is size 6"x9¼", single units for 300 to 550 words. Four-page units for 1,500 to 1,800 words and eight-page units for 2,000 to 3,500 words to the lesson are desirable. All work should be written by the instructor, set up and printed by the students.

The subjects can be divided into the following lessons:

English. Nouns, 7. Word Study, 12. Verbs, 1. Pronouns, 1. Adjectives, 1. Conjunctions and Interjections, 2. Adverbs, 1. Prepositions, 1. Formation of Plurals, 2. Symbols and Reference Marks, 1. English Shall and Will, 1. Compound Words, 1. Letter Writing, 2. Division of Words, 2. Paragraph, 1. Abbreviations and Contractions, 3. Introduction to Punctuation, 1. The Period, 1. The Comma, 1. The Semicolon, 1. The Colon, 1. The Dash, 1. The Hyphen, 1. Brackets, 1. The Apostrophe, 1. The Exclamation Mark, 1. Quotation Marks, 1. Marks of Parenthesis, 1. Capitalization, 1. Proof Reading, 6. Printing Terms, 25.

History. Printing, 1. Printers, 1. Type, 1. Type Metal, 1. Paper, 1. Point System, 1.

Science. Iron and Copper, 1. Manufacture of Paper, 2. Ink, 1. Water, 1. Air, 1. Color Work, 1. Paper (Kinds and Uses), 1. Paper (Newsprint), 1. Book Paper, 1. Bond Paper, 1. Enameled Paper, 1. Card Stocks, 1.

Arithmetic. Addition, 1. Subtraction, 1. Mutiplication, 1. Division, 1. Common Fractions, 4. General Problems, 1. Roman Numerals, 1. Denominate Numbers, 1. Interest, 1. Weights and Measures, 1. Numerals and Numbers, 1. Point System, 1. Paper Problems, 6. Press Work, 1. Figuring Stock, 1. Stock Cutting, 4. Paper Weights, 1.

Production in the school has always created more or less discussion among superintendents, directors, principals, and instructors. The amount of work that should be done in any school should be gauged by the number of students and the equipment. Enough time should be allowed for the student to receive the necessary instruction for doing the work in the manner that the job would be finished in the shop.

No specified time can be set for instruction in the composing room or press room. Each job as presented to the student has its different style of type, various measures in lengths and widths, stock and inks, length of run, work and turn, back up, etc. All of these require time, so the smallest amount of spoilage, and better work will be the result.

Then only can we expect and realize that the school is of service to the community, and the student becomes master of the mother of arts—*Printing.*

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INDUSTRIAL-ARTS MAGAZINE

E. J. Lake S. J. Vaughn

Editors

PARENTS AND TEACHERS

The exchange of interests between parents and teachers through parent-teacher associations is a significant movement in education.

The home no less than the school may be developed by this wholesome exchange of interests.

Exchange of ideas and ideals between teachers and parents challenge both with a keen sense of responsibility. The political pot begins to bubble and the school election registers a vote that is almost representative of the community.

One state parent-teacher meeting held in April was attended by delegates who represented twenty districts of the state and numbered more than a thousand mothers, who listened to a program which was more in emphasis of the need of better home influences than of changes or improvement in school conditions. This increasing concern of parents in the school and home presents the capable teacher with a splendid opportunity to improve school and teaching conditions.

Parents are rarely acquainted with the best pedagogical methods.

Teachers who know how to teach can enlist the support of parents by spreading the gospel of pedagogy.

Industrial-Arts make a strong appeal to parents as a school subject of study. At the state meeting cited above the art and manual training exhibits were of especial interest to the parents.

It so happened that one school was represented by art work of a pictorial and copied sort. This work was exceedingly attractive with highly colored paper and paint. Ornament was applied with little restraint or propriety.

Adjoining this pretentious show was the work of a school in which the art work was well planned and directed to the development of taste in design. Here was a most interesting object lesson and judging by comments we heard, not a few of the parents who compared the work were convinced in favor of the consistent work as opposed to their first impression in favor of the pretentious show.

The teacher and parent may learn much of mutual benefit from each other. The parent and teacher in association can do much for the schools and the children.

APPEARANCES AND USEFULNESS

Time was when industrial workers of this country were satisfied to turn out products that would do the work for which they were produced and nothing more. Then goods were imported for the few nabobs who could afford them.

Now we live in luxury that the well to do of a century ago did not conceive and could not have secured if they had conceived.

And yet our objectives in industrial art instruction and our projects for instruction in industrial art are predominantly utilitarian.

Whether it be a toy, a tool or a machine, something for the house or something to wear, the first question asked and often the last question asked is, *will it work?*

We pride ourselves on our practical standards and our standards are mechanically biased.

Teachers no less than parents when asked for judgment on a school product often confine their judgment to the utility of the product.

Will it work? If it works smoothly and well, it is stamped with a conspicuous capital O.K. If it looks well at a little distance but creaks a little here and there, it is given some credit for good intentions and industry, and is pronounced *fair for school work.* If it is shoddy and carelessly put together, it is passed in charitable silence and condoned as *school work.*

Industrial art teachers have not as yet aspired to the standards of the market.

Trade must have salable products. Salable products must appear well above other things: The implication of "a thing made to sell" is that it appears well but is of doubtful usefulness. A product to sell continuously must *look well, work well,* and *wear well.*

When educating the producer the industrial art teacher must hold to this triple standard.

When educating the consumer the industrial art teacher must consider appearances important with usefulness.

The producer is educated to produce for the modern market. The consumer is educated to a choice of beautiful and useful productions. The standards of the producer and the consumer set the standards of the market; the standards of education are the standards of desirable living; desirable living is beautiful and useful.

SUMMER SOLILOQUY

They say summer schools are not quite so well attended as last year; I am not surprised; it has been so easy to spend and so hard to save during the past school year that my banker lost his chummy smile in June.

I was reminded of old times by that "over drawn" notice and concluded to turn a penny this summer; that BZ degree will have to wait.

Oh well! There was little promise that I could get my money back for several years even if I did get the degree this summer and as for being educated I am feeling less so each year.

Funny thing this education stuff; it is something like pop-corn or cracker-jack, the more you get the more you want and the less you feel that you have had.

Just now I am rather happy in my choice of going to work in place of going in debt this summer.

I have worked and played with a lot of fellows who seem to have a different point of view in life than the school bunch.

For the first week I was dead tired when the shop closed and slept ten hours each night; now I have as much time to myself as I had when school was on and much less worry.

When the whistle blows at five thirty we clean up and go out for a little sport.

That training in baseball when I was a kid come in handy this summer. At first Mike put me in at short on the shop nine; a few fumbles put me on the bench; as luck would have it Casey wasn't as good at bat as his ancestor and Mike put me in the field; I always did have a way for quick action when it was needed and could wait on the poor ones and pick out a good one in a pinch.

Oh no! I am no Babe Ruth and never will be; at that I fancy Babe would make out no better at teaching than I make out at his job.

When Babe goes hunting next Fall I will be back in the old school shop with a half inch of tan on my face and hands like leather.

My supplies were all ordered in June and I will have a fine bunch of boys who will be just like this bunch I am working and playing with, only smaller in size and greater in numbers.

My advice to teachers is to knock off on school once in a while, get down from the pedagogical pedestal and mix with our fellow men.

It surely helps a lot in teaching to be one of the human race.

A DUTY OF THE TEACHER

The editor of the "Vocational News" of the Essex County, N. J., Vocational School, gives the following bit of pertinent advice to the members of the graduating class:

We deem it advisable, now that graduation time is here, to add just one more piece of advice. But our warning is different. You boys who are about to enter industry will be faced with the necessity of purchasing tools. Tools cost money and money comes rather slowly. So save as much as possible. Then go to your shop teacher, explain your mission to him and you will be rewarded by receiving the benefit of his experience in choosing and purchasing tools. This advice is given with one thought in mind: the instructor knows more than you do about such matters and will save you disappointment and worry if you allow him to help you.

Every graduate of a trade school has not only received complete instruction in the proper use of tools, but has become familiar through daily use with the best types and makes of tools and machines in his future trade. At the close of his final term, the boy may well expect that his instructor will be ready to advise him on the kit which he will require for the particular job or shop he is about to enter. And the teacher should consider it a duty not to let the boy go without his help.

FOOLING YOURSELF WITH A RUBBER RULE

Barnes was shaking his head over a new textbook when I visited him. "It's a hard thing to find vocational texts which I can use in teaching vocational classes," he complained. "I have no trouble getting plenty of texts to use with my manual training classes."

"How come, Brother Barnes?" I asked for the situation sounded interesting to me. It was some time before he had the problem in shape and then he said:

"I must have practical jobs when I teach vocational classes in order to develop skill. These must be done with present equipment, in the time allowed, and from materials available in our town or within a quick delivery distance. I must have information sheets or texts at hand for auxiliary information and the related science covered in the practical jobs. If my students cannot connect up their mathematics with the practical job, then I must teach a little shop mathematics on the side. O, it is no snap to teach vocational shop classes these days."

"And none of these things apply in manual training?" I asked.

The answer finally came—

"Every blessed one of these things does seem to apply in greater or lesser degree, after all but we 'get by' somehow in manual training and surely get shown up in vocational training." . . .

"Why is it that vocational work is constantly being measured? What do the men in the trade have to say about equipment and methods of teaching? Were the boys employable at completion of the work? Do the boys hold the jobs, get raises, and continue on the job? All these requirements form graduations on a hardened and ground steel scale. With such a rule the vocational work can be measured with exactness.

"Industrial arts has a cultural aim, so they say. It is intended to increase appreciation of craftsmanship, and to instill habits of good workmanship. All such things are marked, dimly perhaps, upon a rubber rule which can be stretched or compressed by the instructor. We can't get any two instructors to agree as yet as to just how much space upon the rule should be allowed in any one division. It is a rubber rule and we so stretch it and compress it—and 'kid' ourselves about the result of the measuring."

"The day of the rubber rule is passing," concluded Barnes, "and in its place will come a hardened and ground steel scale. Its graduations will not be the same as those upon the vocational rule and they should not be, but they will be a true measure of accomplishment—with no stretch."—*Laurence Parker.*

Interesting Problems in Paper Cutting

EXECUTED IN COLORED EFFECTS BY GRADE CHILDREN IN THE SCHOOLS OF COLORADO SPRINGS, COLORADO

Richard Ernesti, Director Art Education, Colorado Springs, Colo.

I have for many years pondered over the problem, whether to let color study or form study have the right of way in any class work in art education. As yet I have not arrived at an entirely satisfactory conclusion, but this one thing I have learned from my students, children as well as grownups, who came to the University with the love and earnest desire to learn something about art; and that is that they both succeed better in expression in either form or color through the use of paper cutting.

The illustrations this article carries with it, should be seen in the originals to be fully appreciated, especially those in which more than one color was used. However, some idea can be formed from the differences in values in the reproductions. The little landscapes alone are gems of which many an artist might be proud from the standpoint of color combinations made by these children.

Plates 1, 2, and 3 are the result of sixth grade children's effort, I admit after considerable practice. I have made it a maxim to urge: GO SLOW. I also make it a rule: REPEAT; in other words, DRILL; do it until you can do it right, and here you have the results. Someone will say: What's the use, the good after the cuttings are made? In the first place the child learns much about pattern, balance, radial and bisymmetric, as plates 1, 2, 3 show, but that is not all. We use the same patterns or some much like these for applied design in the decoration of boxes and other articles for gifts at Christmas and birthday occasions. Almost every one of these designs has adorned some nice Christmas article last season. It is really surprising how the interest does take hold of the children in the cutting when once they discover that they are able. In painting I must admit we are still much in the air; the reason perhaps lies in the fact that the painting supplies both in colors and brushes as well as papers used are so very inferior to the fine colored papers in the market. So the emotional response to color and

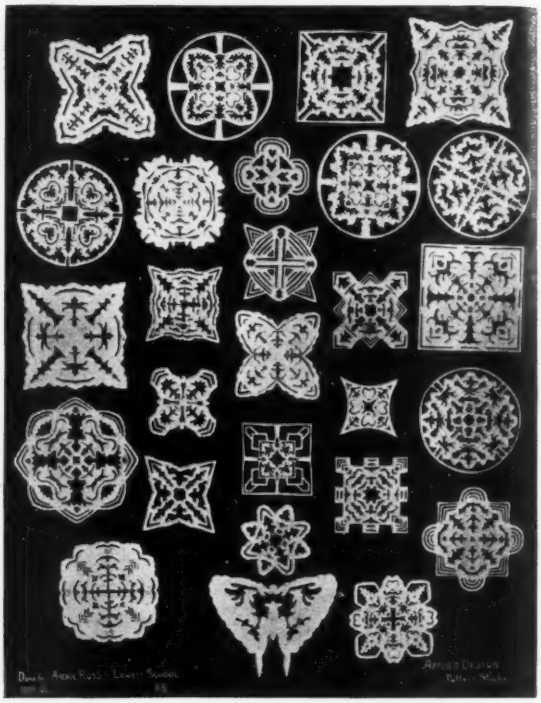


FIG. 2.

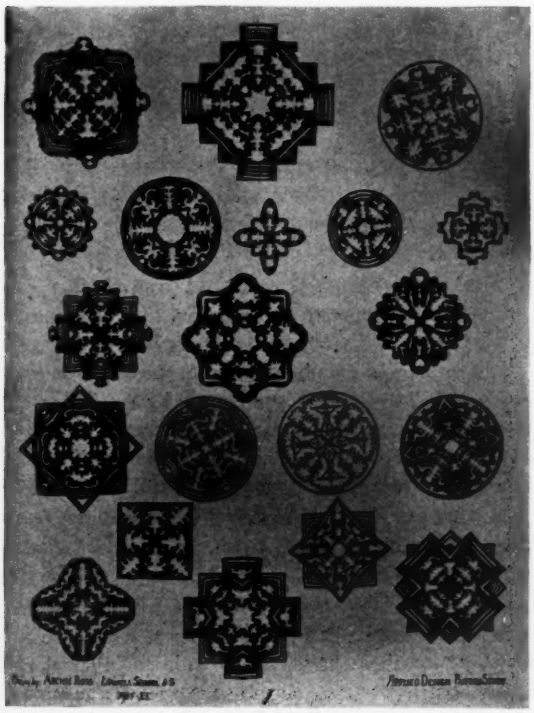


FIG. 1.

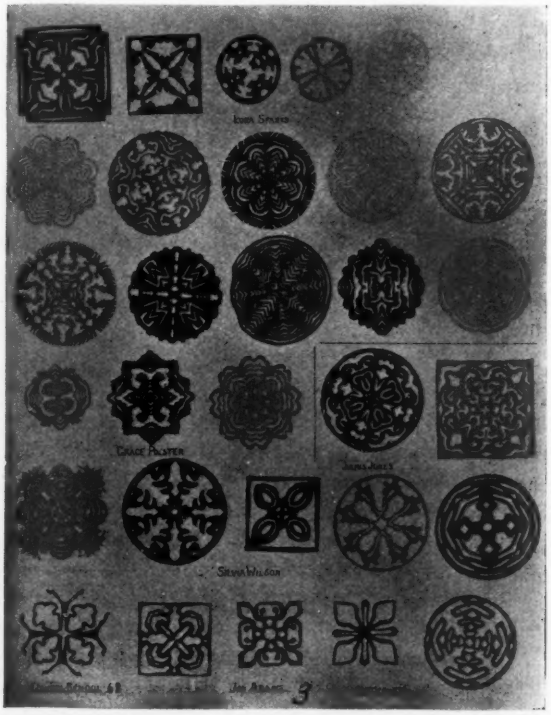


FIG. 3.

TYPICAL PAPER CUTTINGS MADE BY CHILDREN IN THE COLORADO SPRINGS SCHOOLS.

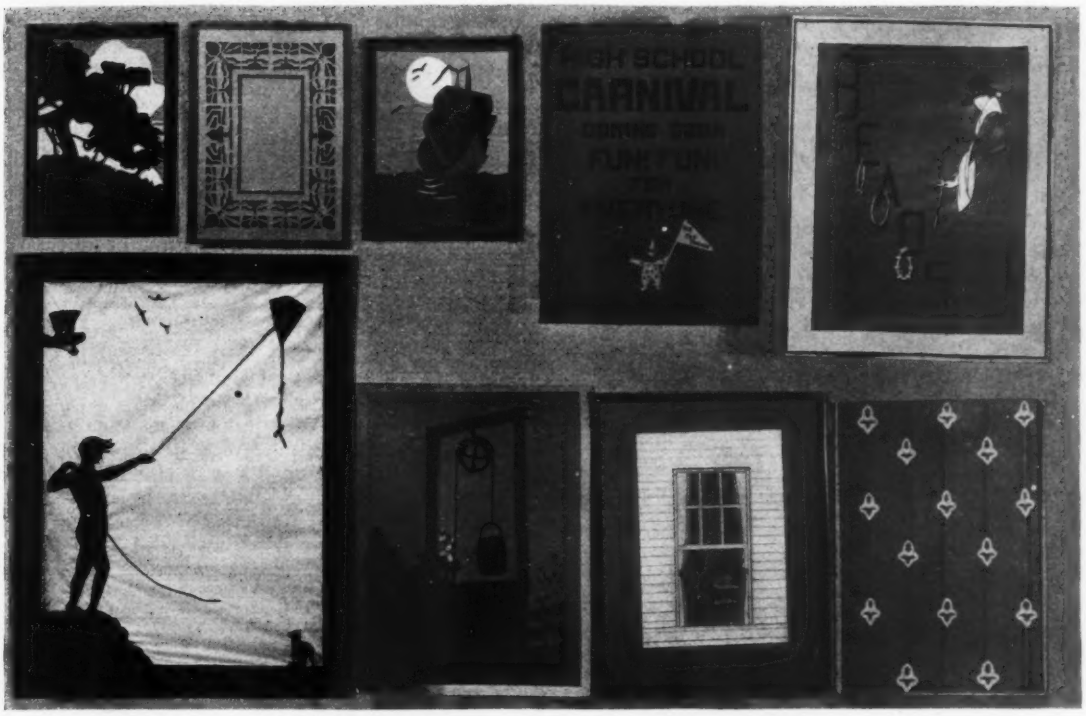


FIG. 4. DESIGNS CUT BY CHILDREN IN COLORADO SPRINGS.

cutting it up and *composing it* into something worth while is so much easier and quicker than the labored mixing, handling of water colors, or even oily wax crayons, that will not come off or will not go on top of each other to blend and mix.

When Miss Bonnie Snow discovered the ease of cutting letters from paper and arranging them before pasting in various ways and experiments, she gave us a discovery most worth while; it was one of the great blessings that came as a revelation to us art teachers; it is the guiding finger to success in lettering. Illustrations Nos. 4 and 5 show good lettering cut by boys and girls who could no more letter with pencil or brush than they could fly when they started with their work. They have no trouble now to make almost any good arrangement acceptable to an art teacher in lettering, and this just through exercise in paper cutting, laying the figures for diverse arrangements, until the satisfactory one is found. Depend on it, they will find it—it is only a question of patience and perseverance; that is all the secret there is about it.

Try it out yourself if you have not done it yet thoroughly, and be convinced. Some children will be best able to cut one thing and some another. I have found children in the first and second grades with a perfectly startling ability to cut animals; I might never have be-

FIG. 5. PAPER CUTTINGS MADE BY CHILDREN AT COLORADO SPRINGS.

lieved it, had not the class of first graders been in my own charge at that time for the problem. Again you will find a boy or girl in the upper grades, who will ably cut human figures as well as some of the old time miniaturists who cut silhouettes.

Paper cutting is an interesting problem for children as well as grownups, and the sooner we learn to make the best of it, the sooner we will be able to carry on toward better taste in color, good judgment of form, and cleverness in arranging compositions.

Ornamental Concrete

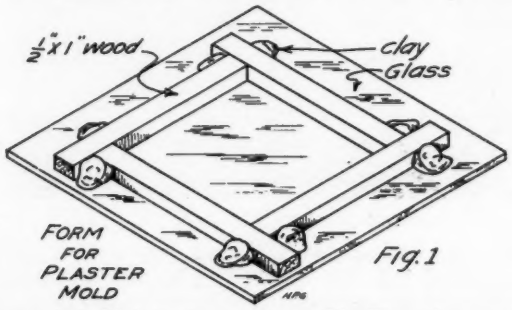
H. P. Gerber, Director of Department of Industrial Arts, Northern State Teachers' College, Aberdeen, S. D.

Lawn Seat

For the lawn seat described in this article we used the one form for the seat slab, although we varied the design of the end support. This gave each student an opportunity to originate an end design—as is the rule in these classes. We show here working designs for two such ends.

The construction of these forms is simple as will be realized as soon as a full size design has been completed, so no explanation is necessary in that connection.

The ornamental panels used are of two types; viz., I—The design made up of Faience tiles, in various colors and



shapes imbedded in the concrete. II—The color cement tile, imbedded in the concrete with a beveled offset.

First Method

After the full size design has been made by arranging the tiles on the full size drawing, a pencil tracing is made on thin paper and transferred to the inside surface of the form board next to the face of the end support, by means of carbon paper. The tiles are then arranged *face up* on these outlines and glued to the board *face down,* one at a time.

The mold is then filled with a quaky mixture of one part cement to three parts screened sand. The mold must be jarred to force concrete into all small corners. If a fine surface is desired a rich mixture is used near the exposed surfaces and a coarse mixture filled into the center. For the rich mixture it is advisable to screen the sand through a finer screen than No. 4.

In 24 to 48 hours forms may be removed with great care and edges of tiles cleaned of surplus cement with a knife blade. This is necessary as the fired glazed tiles have a slightly convex surface allowing some cement to creep under, thereby spoiling their true shape.

In this instance special Atlas White cement was used.

Second Method
The Color Cement Tile

After a full size design has been made on paper with pencil and water colors or crayons, strips of wood of even thickness are arranged to the exact size and shape, on a piece of plate glass or other smooth surface. These strips are held in place by means of soft clay, as in Fig. I. The inside is oiled lightly and filled with plaster of paris. In a few minutes the plaster will be set sufficiently to remove it.

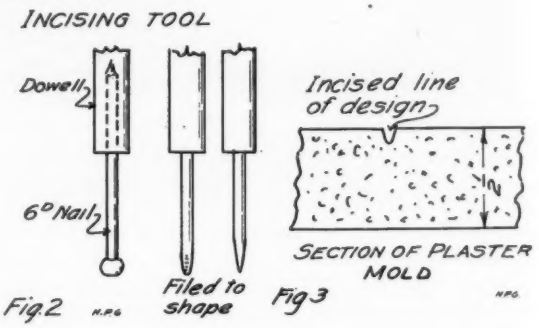
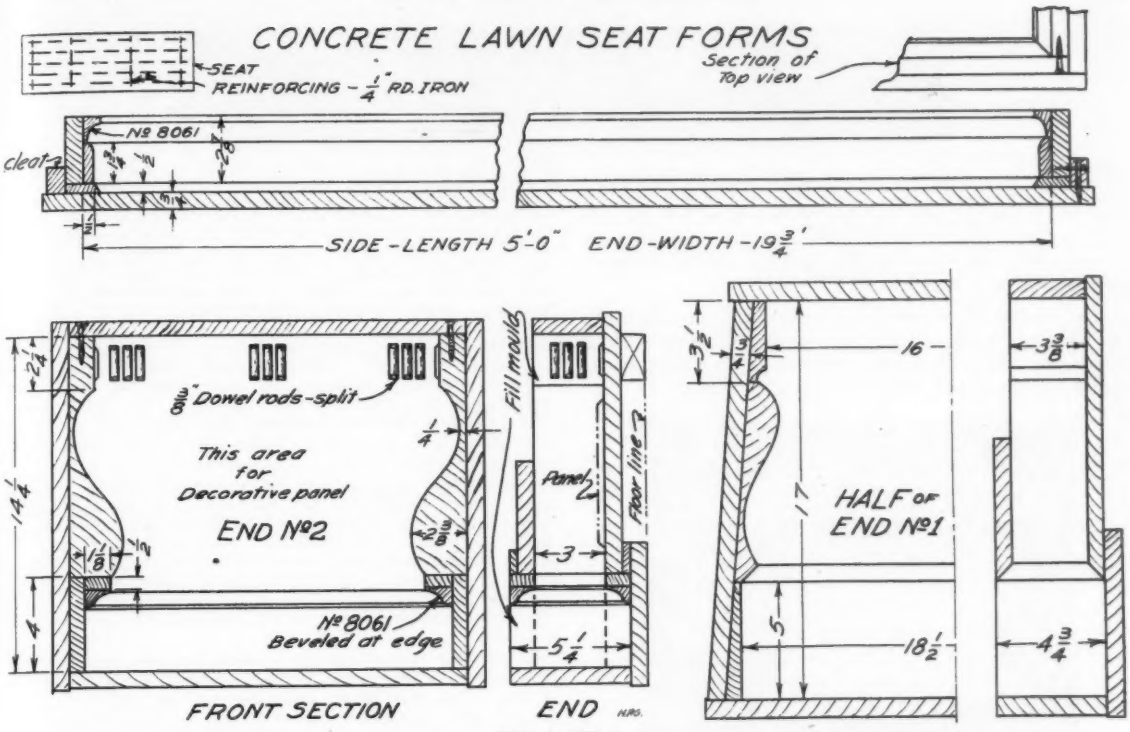


Fig. 4

The design, on a piece of thin tracing paper, is now transferred to the smooth face by means of carbon paper. The design must be inverted in transferring, as this plaster mold is to be a negative.

(LEFT TO RIGHT) 1. END SEAT WITH EMBEDDED TILES IN COLORS. PLASTER FORM USED FOR TURNED PORTIONS IN COMBINATION WITH WOOD. 2. THE SEAT WITH END No. 1 AND PANEL OF EMBEDDED COLOR CEMENT TILE.

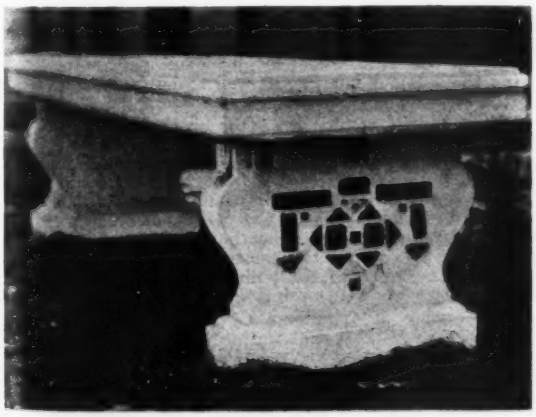


FIGS. 6 AND 7.

FIG. 7.

An incising tool, Fig. 2, is used, to scratch the lines of the design to an even depth of about 1/16" and with no undercut surfaces as in Fig. 3. When this plaster mold is set dry and hard it is given several coats of shellac before using. The face of the plaster mold is now oiled and surrounded with sticks held in place as before with clay. Fig. 4.

A neat cement wash of Portland cement and mortar black or other water soluble black is first poured on the surface to fill all incised lines. This is backed with a 1 to 2 mixture of cement and screened sand, no color being used. A piece of No. 3 wire mesh is forced in last and the surplus concrete struck level but not smoothed.



SEAT WITH END No. 2 AND PANELS OF CLAY TILES IN COLORS.

SEAT WITH END No. 1 USING A SPECIAL FACE BOARD WITH FORM HAVING A RAISED MONOGRAM OF WOOD.

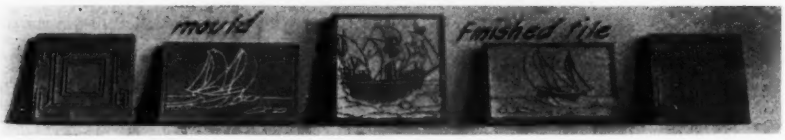
On the following day the concrete and plaster mold are carefully pulled apart and the concrete is placed in water for hardening.

Applying Color Cement

Water soluble plaster colors, or Petrona, mixed dry with Atlas white cement in such proportions as required according to depth of color in design, constitutes the color cement. To this mixture is added enough water to form a thick cream-like mixture.

The Seat Slab

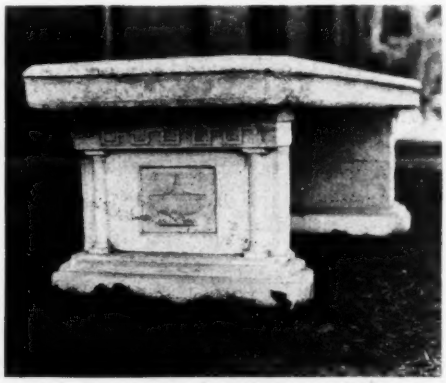
Before casting the seat slab, the reinforcing rods are arranged in the bottom of the form. The mixtures and



MOULDS AND FINISHED TILES FOR CEMENT WORK.

method of placing are similar to the ends. When the form is filled, strike it level and allow about one hour before troweling the upper surface smooth with a plasterer's steel trowel.

After the piece has been removed from the forms and allowed to season for two weeks in damp sand or water, the rough edges or surfaces may be smoothed up with a carborundum rubbing brick and water.



A SEAT WITH A GREEK END AND COLOR CEMENT TILE. PLASTER USED FOR COLUMNS. WOOD USED FOR REMAINDER OF FORM.

One-color at a time is mixed and applied by filling a small water color brush which is held vertically over the area to be filled, and squeezed to force the color cement to drip into place. The tile may be agitated to force the color to flow into all parts of the space or the incising tool may be used to draw the color to the raised edges, but the surface of this soft color should never be touched with the brush or fingers. The tile should be wet while the application takes place, but water must not stand on the face of tile. In order to produce an excellent looking tile, no color should cover the black ridges at any point on the tile.

Allow the tile to remain in a shallow dish of water for a day or two, when the color will be set and the tile can be used for the main project. No water should touch color cement.

Fig. 7 shows the method of fastening the tile into form by pressing its edges into continuous strips of clay which are beveled afterwards with a knife blade. After the concrete has been cast around this, the next day, the forms and clay must be removed and an inset panel with beveled offset is the result.

This type of work is substantial and will not fade. The photographs represent pieces that have stood against all kinds of weather for three years.

THE OKLAHOMA CITY OPPORTUNITY SCHOOL

Cora Miley

The Opportunity school is one of the outstanding units of the Oklahoma City school system. It ranks third best of such schools in the United States, according to a survey made by Mr. Arthur Dean of Columbia University. Mr. Dean rates the one in Denver first, and the one in Atlanta, Ga., second.

The Opportunity school in Oklahoma City had its beginning ten years ago when J. A. Whiteford, then Superintendent, took eleven misfit boys, put them in a room by themselves, and appointed Miss Mamie Franks, a grade teacher, as instructor, because of her broad sympathies for such children and her fitness for the work. The school has grown to an enrollment of 450 students with twenty teachers. Miss Franks is still principal.

In the beginning Miss Franks saw that the strongest appeal would be made to such boys through some kind of manual training. The opportunity for training, however, was limited, only one-half day every two weeks being available. Realizing the necessity for more hand work to stimulate development, she asked the board of education for some material from which to make toys, and an allowance of $8.50 was made.

With this amount Miss Franks bought lumber, coping saws, brass, paints and brushes, and with her assistance and direction the boys began the construction of toys in the schoolroom. This work so stimulated interest that the boys worked early and late. Attendance jumped to a hundred per cent. When they had finished the toys, they put on a sale and doubled the money allowed by the board. Thus the problem of interest and holding power was solved.

In time the school grew until another teacher was necessary, and a regular manual training department was added. The enrollment grew to such an extent that at length new quarters were necessary. An old store building and a small duplex house were converted into use. Still another teacher was added to the force.

At the beginning of the fourth year these quarters became inadequate, and an old church and parsonage were purchased. The auditorium of the church was used for a gymnasium and assembly room. Miss Franks lived in the parsonage and provided living quarters for boys who had no homes or were temporarily away from home. She supported these boys for some time from her slender salary. Through the influence of a friend the attention of the rotary, the co-operative—and the lions' clubs was enlisted and they contributed very materially to the support of the boys.

In the sixth year a two-room annex was moved on the grounds and two additional teachers were assigned. At this time it became apparent that, in the solution of the problems of social adjustment and school work, it was necessary to find part-time work for a goodly number of boys, compelled to earn their own living and in many cases to contribute to the support of others. The finding of employment for these boys was added to Miss Franks's other duties.

At the beginning of the eighth year, the co-operative club, looking for some constructive work to do, undertook the sponsoring of the Opportunity school. They give the school a Christmas tree and a Spring picnic every year.

They have installed a carpet loom, and equipment for the manufacture of brooms. The latter is a most successful financial project. The factory runs twelve months in the year, and provides employment for boys during the summer months, as well as half-day work during the school term.

Through the influence of the co-operative club the school was organized in conformity with the standards for vocational work in order to secure Federal aid. Under this plan, it became necessary to accommodate employed girls as well as boys for part-time education. A bake shop has been added where the girls make whole wheat bread, rolls, salad dressing, doughnuts, and cookies, which find a ready sale among the housewives of the community. With the completion of the building program, a substantial brick building was assigned the Opportunity school.

The people of Oklahoma City heartily support the school. There is the social welfare side of the work and Miss Franks has gone early and late, to try and adjust most impossible domestic situations. She has given of her time and money to help in offering aid to these pupils, and without this love, service, and forgetfulness of self on her part, the school could never have reached the stage of its present usefulness.

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, pattern-making, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

WIGGLE WAGGLE TOY

Charles Rice, North Junior High School, Everett, Wash.

(See Supplement No. 29)

This toy may be used as a basis for developing other toy designs in the school shop. Although simple in construction, it is an interesting toy and quite life-like in its actions.

Base—The base may be made first. The size is one inch thick, three inches wide, and nine inches long. A lead weight should be used in the base. A screw eye is used at three.

Wheels—The two rear wheels have the holes bored ¼" from the true center. The wheels are fastened to the base with 1½" R. H. B. wood screws. It is well to use a washer on each side of the wheel to allow enough play.

Body—The body is sawed and carved from a light piece of wood. Lead should be used to make the rear of the body heavier. Wooden beads are used for the legs. These may be made, or purchased in the ten cent stores. The rear legs are held up by a narrow watch spring. This spring is looped through two holes in the base and the ends anchored in the body by driving in a wooden peg. Spring wire is used in the forelegs and looped through holes in the base.

Tail—The tail is made from a short length of spring from a window shade roller. A strong cord or braided wire is passed through the spring and pegged to the body. A wooden bead is fastened to the other end.

Different animals may be used for the design. Use watch spring and spring wire for different results.

A DOWELING CHUCK

John A. Faust, Mt. Vernon, New York

(See Supplement No. 30)

The doweling chuck shown was made for our woodworking department for cutting ⅜" dowels on the ends of ⅞" sq. rails. It was made to fit one of the wood turning lathes having a No. 2. Morse taper.

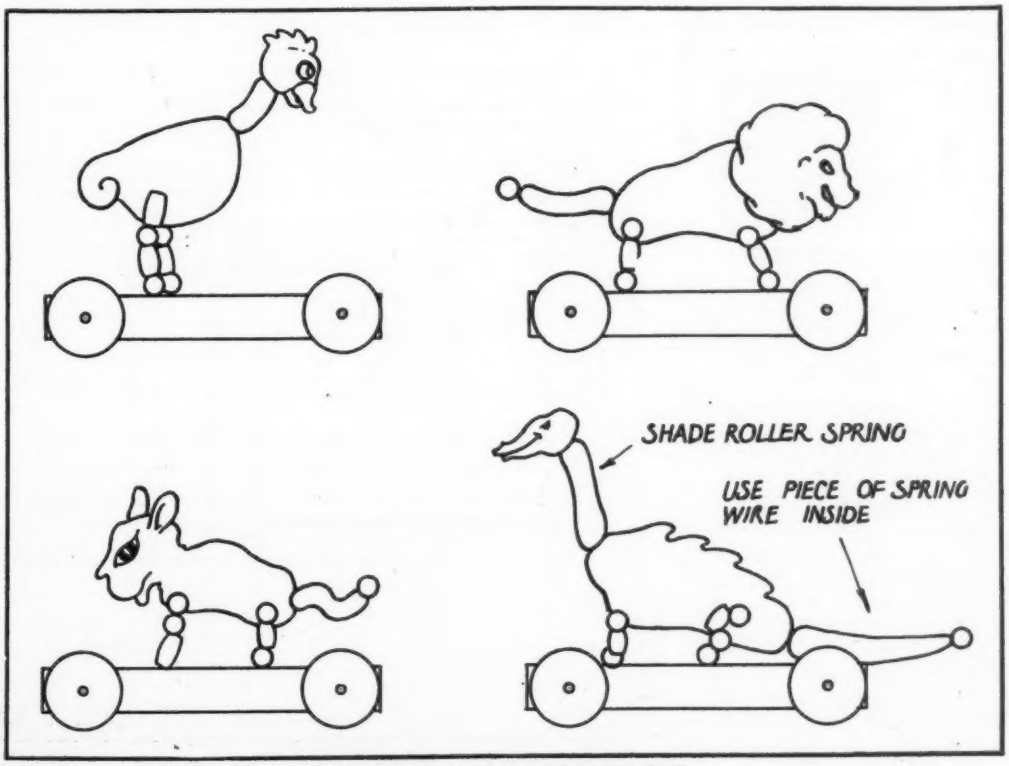
This chuck is limited to the ⅜" dowel only and it is necessary to make one for each size wanted. As the sizes generally used are ⅜" and ½", two chucks only are wanted and this does not warrant the making of an adjustable type. However, it would make a good problem if one wanted to go to that trouble. These stationary chucks, when once set, remain set unless it becomes necessary to sharpen the knife. If this knife is made of high speed steel it will last a long time after each sharpening.

Many operations are necessary in the making of this job. The taper shank should be long and fit the hole in the lathe exactly so as to prevent the chuck from loosening up due to vibration. The chuck should be well balanced to prevent excessive vibration. This is done by removing metal on the opposite side of the chuck until it balances between centers with the cutter fastened in place.

A TEACHER'S UTILITY DESK

Anton Anderson and Alan Nicol, Buffalo, New York

In the designing of a piece of furniture a number of points are taken into consideration. Fitness and convenience are the most essential of these elements—"fitness"



SUGGESTIONS FOR WIGGLE-WAGGLE TOYS.

for the purpose for which it is made and "convenience" for the way it is made. These two may be summed up in the word "utility."

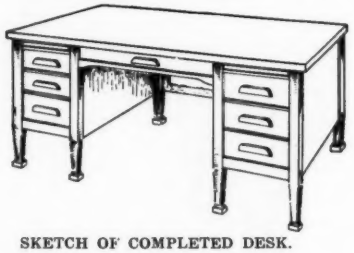
If the purpose being known, and the period of design to be followed has been determined, it is highly desirable that one familiarize himself with the outstanding characteristics of that particular style or period in order to get symmetry and harmony suitable for the project in mind. Next in order of importance is a knowledge of the proper dimensions and proportion, the kind of material most suitable, and the kind of finish it will require in order to realize the mental idea. A thorough knowledge of the various types of construction is essential to one attempting to design a piece of furniture. It is these qualifications that make it possible for one to embody fitness and convenience in a project and make for real utility.

The accompanying design of a teacher's utility desk is representative of the efforts of one who keeps the foregoing facts clearly in mind when designing. It is complete as to layout, type of construction, perspective sketch, and detailed bill of material. It is made in what is known as the knocked-down type of construction; e. g., the two end cabinets, the top, the center back frame, and the center parts are all completed separately and are assembled to complete the project. This results in a unit, permanent in every detail, easy to move about without fear of breaking joints or racking.

The drawing shows three views as is customary in the industry. One-half of the width of the desk is shown in the front view, drawn to the left. It gives all details of the left hand cabinet, one-half of the center drawer, the construction of the top, and how it is fastened to the bottom sections.

Above it is the top view or ground plan which gives the construction of the frame panel backs.

The side view in the lower right hand corner, shows the full depth of the desk and, in reality, is a cross-section

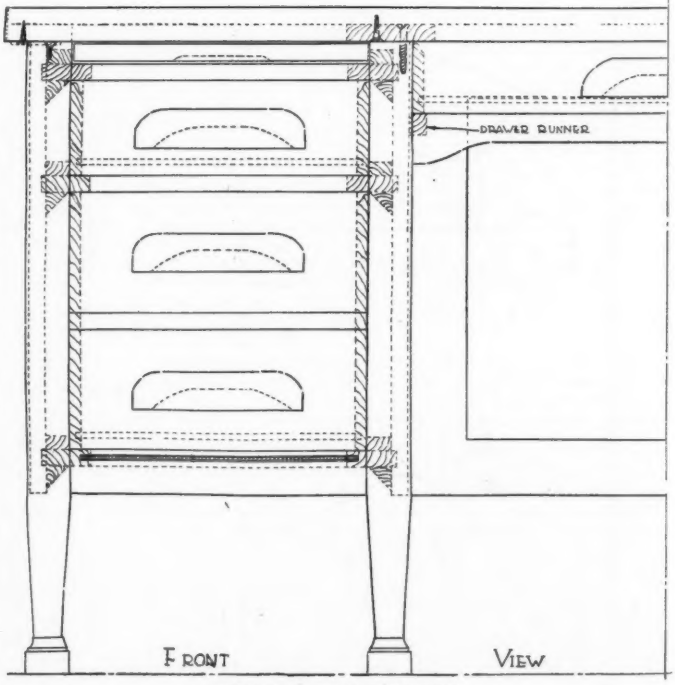


SKETCH OF COMPLETED DESK.

BILL OF MATERIAL

Parts Allowed	Name / Material	Length	Width	Thickness / Stock	Remarks
1	TOP	60	32	1	
4	OUTER STRIP	60	1	1/8	
2	FILLER ON END		3	26	1/8
2	CENTER FILLER		28	4	1/8
8	LEGS		28	2	2
4	ENDS		28	26	3/4
4	SLIDES		27	3	3/4
4	CLEAT ON SLIDE		13	3	3/4
3	FRAME RAILS		16	3	3/4
2	FRAME SIDE RAIL		23	3	3/4
1	FRONT RAIL BOTTOM FRAME		16	2	3/4
1	BACK RAIL BOTTOM FRAME		28	2	3/4
1	SIDE RAIL		23	2	3/4
1	DRAWER FRONT		15	4	3/4
2	DRAWER FRONT		15	8	3/4
1	CENTER DRAWER FRONT		23	5	3/4
1	CENTER BACK RAIL		23	3	3/4
2	BASE RAIL END		15	2	3/4 O
2	UPPER DRAWER SIDES		23	4	1/2 O
2	LOWER DRAWER SIDES		23	11	1/2 O
2	CENTER DRAWER SIDES		23	5	1/2
2	CENTER DRAWER BACKS		23	4	1/2
2	UPPER DRAWER BACKS		15	4	1/2
2	LOWER DRAWER BACK		15	11	1/2 O
2	DRAWER BOTTOM		15	27	1/4 3 PLY
1	DRAWER BOTTOM-CENTER		13	27	1/4 3 PLY
2	BOTTOM DRAWER SIDES		11	28	1/4 3 PLY
2	BACK FRAME STILES		60	2	3/4
1	BACK FRAME RAIL		31	2	3/4
2	BACK ENDICE RAIL - CENTER		13	2	3/4
2	BACK PANEL		29	28	1/4 3 PLY
1	BACK PANEL - CENTER		13	28	1/4
4	DRAWER PULLS		BILL		

BILL OF MATERIALS.



DETAILS, TOP AND FRONT.

of the desk as it would appear if it were cut in two halves. In the same view a detailed drawing to scale is shown of how the under side of the top is built up. This should eliminate all question as to how the built-up top is made. It will be noted that the center piece is screwed to the top, not glued, with the grain running across it. This aids materially in keeping the top straight. This view also illustrates the construction of the drawer pulls and the slide under the top. The front and end views give the complete view of the leg which is of the Adam type.

The dowel type of construction is used throughout. No allowances have been made in the bill of material for tenoning.

It will be noticed that no dimensions are given on the drawing because it is not a customary industrial procedure. The bill of material in conjunction with the drawing suffices.

While the desk is strictly an American type, features of the Adam design play a very important part in it. The independent center, the individual end cabinets, both originated by the Adam brothers, are carried out in the true Adam period spirit.

The fact that the project is void of ornamentation does not necessarily mean that ornaments cannot be used on it. In fact, they may be used well without destroying the character of the design. On the upper end of the legs an oval rosette of the Adam type may be placed. The face side of the legs may contain three flutes and the bottom part of them may be bandsawed to conform with the Adam design. In the center an ornamental base rail cut to the same contour as the upper rail may be placed. The center drawer front and the upper drawer fronts in the side cabinets may be fluted across the grain, providing plain spaces are left to receive the metal drawer pulls typical of the Adam period.

All of these have been purposely avoided in order that a piece of furniture which would answer the object of the design "utility" would result. There are no loose parts, no fads or frills to mar its plainness and simplicity.

To make a desk of this kind is a task worthy of emulation. The so-called built-up top is made 68″x″33 instead of the measurements as listed in the bill of material. All boards are ripped to a uniform width of 6″ to equalize the natural drawing strength of the materials before they are glued. Butt joints without dowels are used. After the top has been glued, it should be allowed to stand in the clamps for at least two hours to allow it to dry thoroughly.

Before planing it, enough lumber to make the two fillet strips 26″x4″, two 60″x3″ for on the edges of the top should be secured and all the pieces dressed to a uniform thickness. One end may now be squared and two pieces 3″ long cut off. The top should be cut to 60½″ in length. The side fillet strips 60″x3″ are now glued on and the pieces 3″ in length glued in place between the side pieces. A heavy piece of stock should be used on the face side of the top when gluing on these end fillet strips to avoid any warping of the top due to the application of the glue and moisture to one side and not to the other. The clamps and heavy pieces should remain in place long enough to allow the top to dry thoroughly—24 hours or more.

The two center fillets may now be screwed in place temporarily. This gives an added strength to the top which is very desirable at this time. The top may now be recut to the finish and pieces of ⅛″ veneer applied on all four edges.

The ordinary type of cabinet construction is used in the end cabinets. The ends are cut in the rough, jointed and glued similar to the top. When cut to exact size in pairs the three dadoes on each side are put in ¼″ deep and ¾″ wide to receive the division frames.

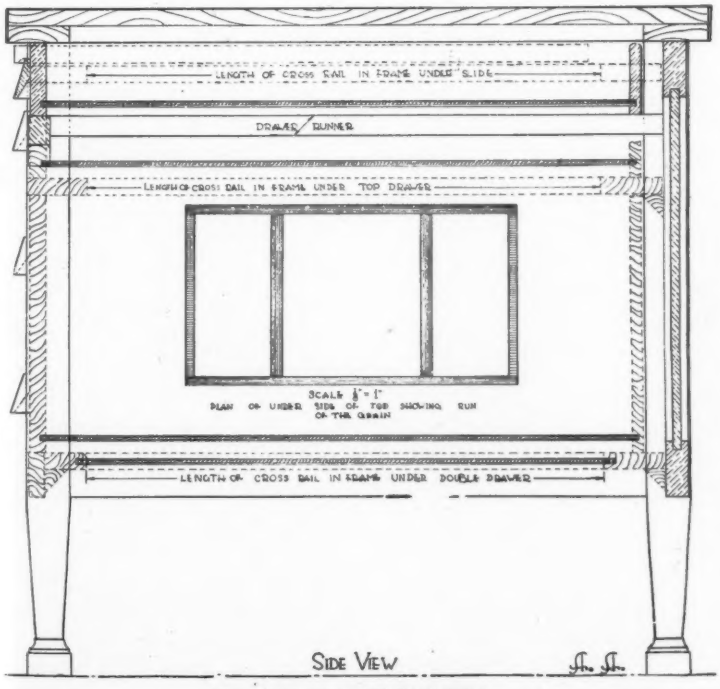
The legs are machined to 2″ square and sawed to pattern both ways on the band saw. The legs and ends are doweled together, three dowels being used in each leg.

The bottom division frame receives a panel to make the drawer dust proof. Three ply panels are used throughout to prevent swelling and shrinking. The back frames are assembled in a like manner with dowel construction and receiving a panel made up of three ply ¼″ veneer as indicated.

The end cabinets are now assembled separately, the division frames being notched and one dowel put in each corner of the frame and leg.

The slides are cleated on both ends, dressed to a uniform thickness and fitted in place 1/16″ play being allowed on each side. As indicated the simple dowel stop is used. The front cleat is gouged out underneath to act as a finger hold when withdrawing the slide.

The machining of the drawers is the next logical operation to be undertaken. The kind of drawer used in this case is known as the box type drawer, one in which the bottom is enclosed on all sides. The construction used is the lock-drawer type which is the most dependable construction known other than the dovetailing. The drawers should be fitted with a 1/32″ play all around and common thumb tacks are applied on all sides to act as "slide-easies" and to prevent the wood from touching on any side. The drawer pulls should be glued on and two


LENGTH OF CROSS RAIL IN FRAME UNDER SLIDE
DRAWER RUNNER
LENGTH OF CROSS RAIL IN FRAME UNDER TOP DRAWER
SCALE ½" = 1"
PLAN OF UNDER SIDE OF TOP SHOWING RUN OF THE GRAIN
LENGTH OF CROSS RAIL IN FRAME UNDER DOUBLE DRAWER
SIDE VIEW

SIDE VIEW OF TEACHER'S DESK.

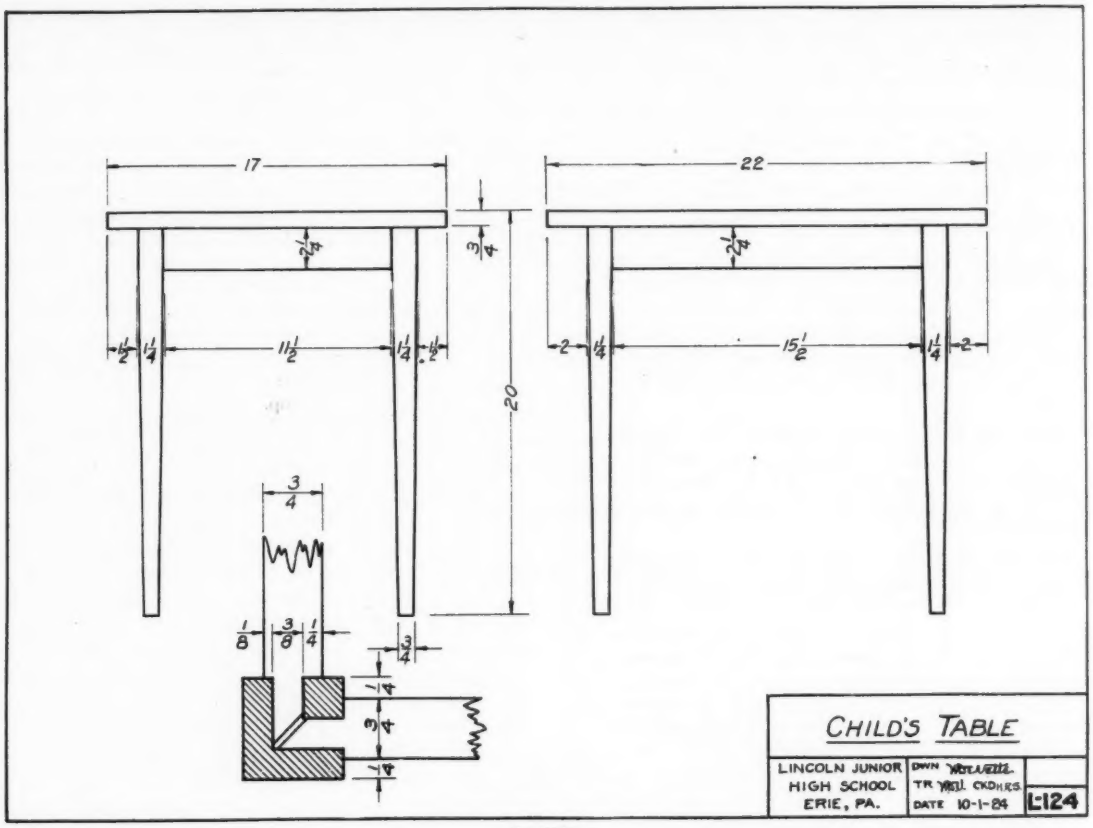


FIGURE 1.

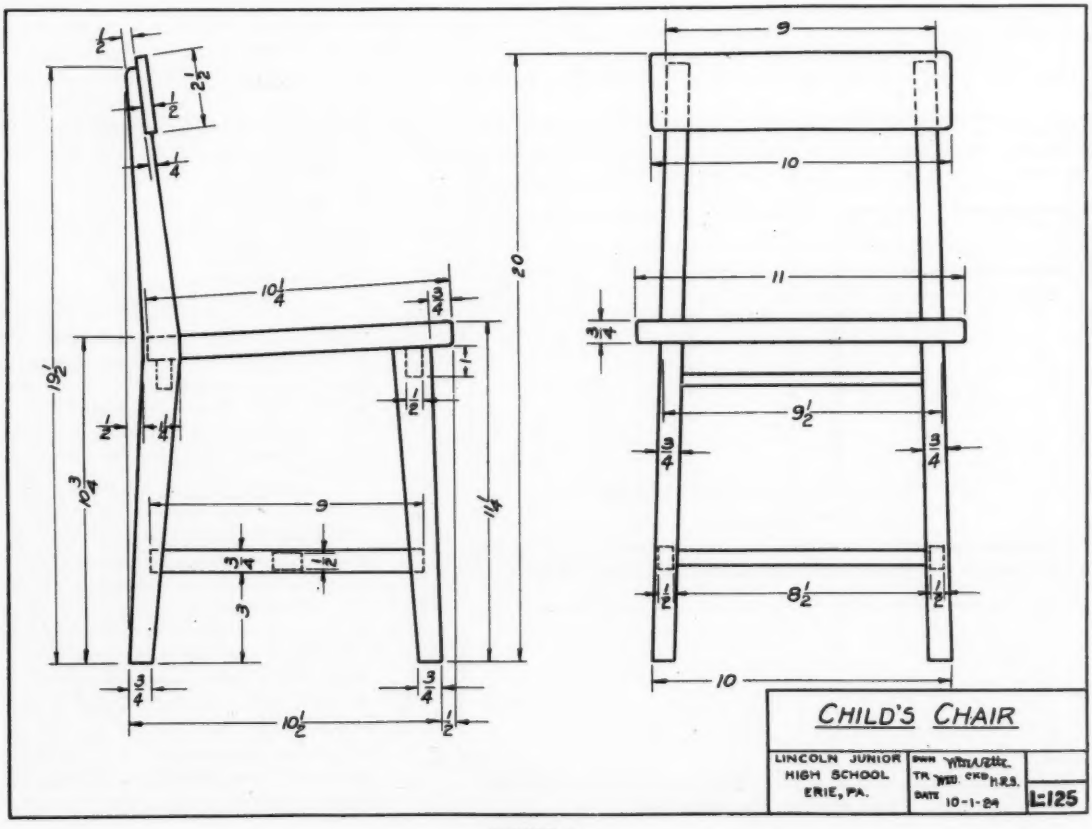


FIGURE 2.

1½" No. 10 F. H. B. screws put in each. The screws should be applied from the inside of the drawer front.

The assembling of the desk is accomplished by means of iron angles, screws, and dowels. Before putting the top in place, remove the center fillet strips which were screwed to the top temporarily and screw them to the centers of the end cabinets. The top should now be placed bottom side up and the remainder of the desk put in place likewise after removing the drawers. The screws are put into the top through the center fillings and irons at each end of the cabinet. It will be noticed that the irons are cut into the end cabinets before top is applied. This means of holding together gives the desk a very permanent and substantial structure.

The finish may be applied before or after assembling. If a wax finish is desired, no sponging will be required as advised in a previous article. A good spirit stain giving the desired shade, two coats of shellac sanded thoroughly and two coats of wax rubbed to a polish will give a good serviceable finish.

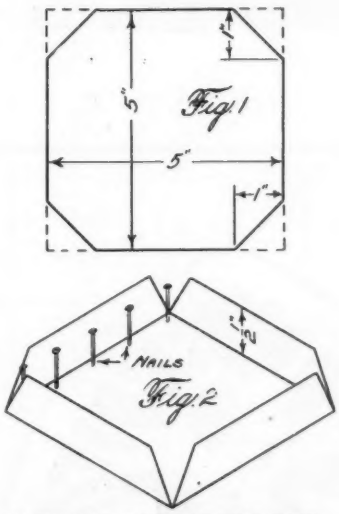
If a varnish finish is desired, it would be well to sponge the project before applying the stain. After the stain has dried thoroughly, it will be necessary to fill the wood with a good wood paste filler which is allowed to dry for 12 to 24 hours. Then a thin coat of shellac is applied. This fills and seals the stain and filler permanently. Three good coats of varnish are next applied. Rubbing with the pumice stone and crude oil completes the desk. If a higher finish is desired, it may be obtained by the use of rotten stone and a finishing oil.

HOW TO PATCH A SHEET METAL ROOF

Louis M. Roehl, Ithaca, New York

A hole in a sheet metal roof which is too large to be soldered shut may be patched as follows:

1. Cut a piece of tin about 5" square and cut off the corners as shown in Fig. 1.



PATCH FOR A SHEET METAL ROOF.

2. Fold up a ½" lap at each edge as shown in Fig. 2.

3. Swab paint on the roof over and about the hole slightly larger than the patch.

4. Place the tin as in Fig. 2 on the hole and nail it to the roof, using shingle nails and driving them about ⅛" from the edge.

5. Cover the nails and tin at the edges thoroughly with paint.

6. Hammer the edges down over the nails so as to cause some of the paint to ooze out at the edges of the tin.

7. Cover the patch and closely adjoining roof with paint.

TO REMOVE A DENT FROM FURNITURE

Leslie J. Miller, Director of Industrial Arts, Rock Springs, Wyoming

After some piece of furniture has been assembled, scraped, sanded, and ready for the finish to be applied, quite often some thoughtless or careless person causes a dent to appear on the carefully prepared surface by hitting with a hammer or mallet, or by dropping something upon the surface. To remove, place a damp cloth over the dent and apply a hot flat iron to the cloth.

The same thing would apply to furniture that has been marred in shipping, except the necessary refinishing after the dent has been raised.

A CHILD'S TABLE AND CHAIR SET

Wm. A. De Vette, Erie, Pa.

A fine gift for a little girl of pre-school age can be made according to the accompanying illustrations which show a child's play set composed of a table and two chairs.

The set makes a particularly strong appeal to the pre-vocational pupil who has a little sister or a niece to whom the set may be given.

It is designed to include many of the principles ordinarily taught in the pre-vocational wood-working classes, none of which, however, are too difficult to be easily mastered.

The size and proportions of the table and chairs are such that they may be used with comfort by girls from 2 to 6 years of age, so that if it is given to a small child, it can be used and enjoyed for a long time.

FIGURE 3.

The set is of substantial construction throughout. The mortise-and-tenon joints connecting the rails and legs of the table make any underbracing unnecessary and thus leave ample room for little feet. This allows the chairs to be placed completely under the table when not in use, saving considerable floor space. The backs and seats of the chairs are tilted sufficiently for comfort in sitting and for neat appearance. The working drawings of the table and chairs are shown in Figs. 1 and 2.

BILL OF MATERIAL

	NAME	No. of Pcs	Thickn's	Width	Length
TABLE	Top	1	¾	17	22
	Side Rails	2	¾	2½	17¼
	End Rails	2	¾	2½	13¼
	Legs	4	1¼	1¼	19¼
2 CHAIRS	Seats	2	¾	11	10¼
	Seat Supports	4	½	1	8½
	Front Legs	4	¾	1¼	10½
	Rear Legs	4	¾	1¾	19½
	Rungs	4	½	¾	9
	Cross Brace	2	½	1	8¾
	Back	2	¾	2½	10

FIGURE 4.

In making the set, poplar or any other available soft wood may be used, as it is to be painted and enameled rather than stained and varnished.

The table top and chair backs should be decorated with an appropriate design of animals or birds such as the one shown in Fig. 3, which was used on opposite sides of the table top. A single duck was placed on each of the chair backs. These show plainly in the photograph of the set, Fig. 4, which was finished with two coats of flat gray and one coat of glossy pearl gray enamel. The decorations are then put on in yellow, blue and green, the latter a blending of the other two, a point on which stress is laid.

A SHOP UTILITY

J. G. Schott, Los Angeles, Calif.

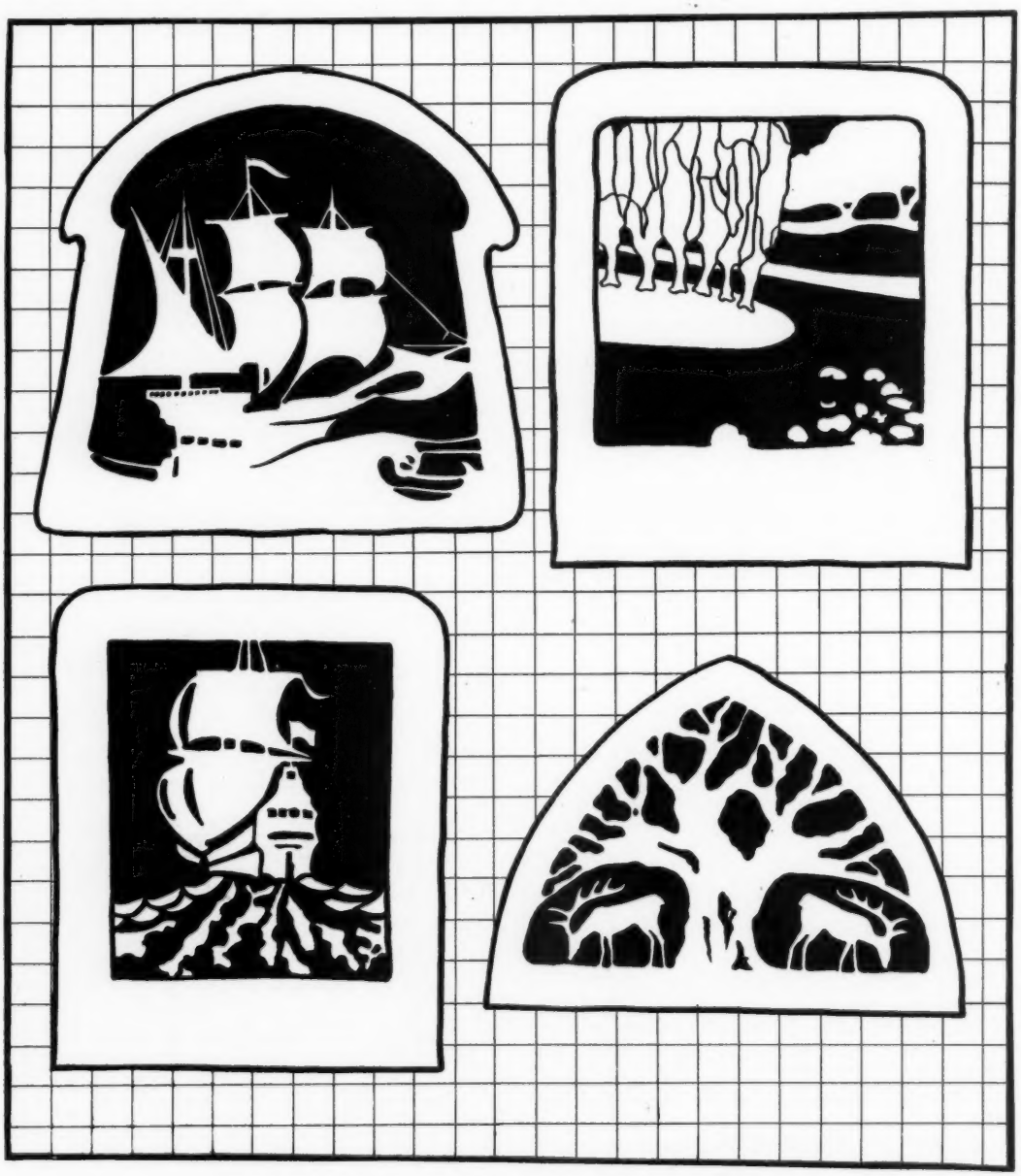
One of the easiest things that boys do is to lose the lids off wax cans or any other cans around a wood shop. I found that by punching two small holes in the lid, running a wire through these holes, and twisting the ends together, I had a nice ring to which I attached a small chain. The other end of this chain is attached to the handle of the can. Or, in the absence of a chain, a series of wire links 4″ or 5″ long will work nicely.

SOME BRASS BOOK ENDS

J. C. Reynolds, Rochester, New York

In the teaching of design we find it desirable to use a great many different materials, thereby varying our methods from the purely theoretical to the actual production of the design in a suitable medium. The beautiful pieces of craftsmanship which we treasure in our museums are illustrations of the fact that design and craftsmanship go hand in hand. So we, as designer-craftsmen, cannot devote too much time to securing the best and most pleasing forms for our materials and the most appropriate ornamentation of these forms.

These etched book ends of brass have been worked out with a decorative treatment of the pictorial as the prin-



DETAILS OF BRASS BOOK ENDS, DESIGNED BY J. C. REYNOLDS.

cipal design. The first step, of course, in a design of this sort is to determine upon the pictorial type that is to be used as well as its general form. This will help, in a measure, to fix the form of the book ends. Certain pictures suggest rectangles, others squares, while others may suggest the use of the curve or other forms. It is possible also to adjust the design somewhat to an appropriate form, but in no case should the lines of the form and the lines of the applied design distract each other. We have found that ships of the Caravel or Mayflower type work out very beautifully in metal. In using ships we must consider the water area as well as the ship form. It is almost always necessary to break up the water into suggestions of waves. These forms can be so arranged that they lead to the center of interest which is the ship. Avoid intricate detail and devote energy to interesting and beautiful space division. Let there be a balance, a symmetry of areas, but a perfect bisymmetric treatment is not desirable.

The actual construction of the book ends involves no serious manipulative difficulties. The 18-gauge metal is cut out with the tin shears and filed to line. The design is traced on with carbon paper. We have found it desirable to use paper clips to hold the carbon and design in place. The design is next coated with asphalt varnish, leaving the parts to be etched bare. Generally we find it best to etch the sky and leave the ship or other principal motive high. Other smaller areas will be etched to bring out the forms. Often fine lines can be etched to carry the form through an unetched area. The shaded parts in the drawings indicate the etching. The back of the metal must also be painted.

The book ends are now immersed in a solution of nitric acid, one-third acid to two-thirds water. If the solution is throwing off strong yellow fumes or bubbling too violently, it is eating too fast and water should be added. Too rapid etching will permit the acid to get under the asphaltum block and spoil the lines of the design. When etched to the proper depth, remove from the acid and rinse in clear water. Clean off the varnish with turpentine.

A line should now be drawn across the metal three inches from the lower end, and the metal placed in a vise with this line just even with the jaws. Bend the metal with the hand as near to right angles as possible, then finish a sharp right angle by pounding with a wood mallet. Sometimes the book ends may be bulged outward by pounding on the back with a round head mallet. The border outside the design may be peined with the ball-pein hammer or left plain. A fine edging with the hammer, leaving the rest blank, sometimes gives an interesting finished appearance.

We have finished these ends both in the polished brass and in the verde green finishes. To polish simply rub with a good metal polish. The green finish on brass may be produced as follows: Mix one part perchloride of iron to two parts water, immerse the brass, and allow to dry.

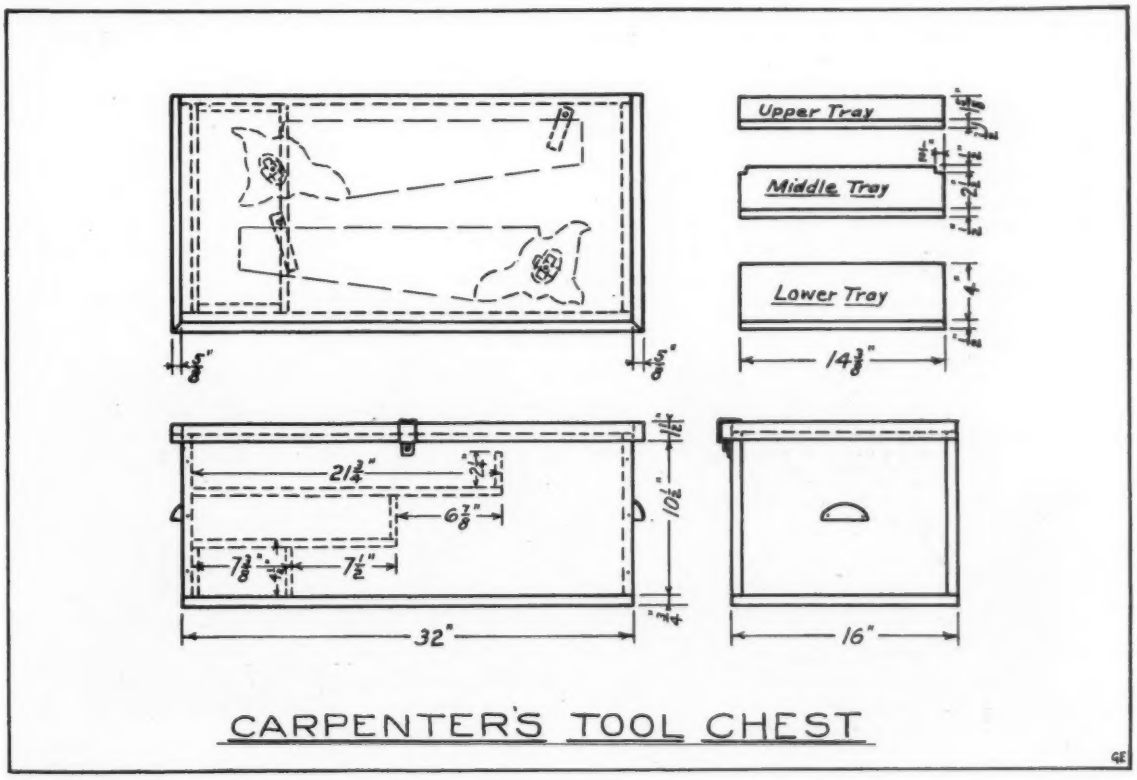
The lacquers are difficult to handle, but good results may be obtained by rubbing on a finish with two or three coats of polishing wax. Cover the base with felt.

A CARPENTER'S TOOL CHEST

Floyd Smith, Miles City, Montana

Granting that you will agree with the following thoughts, permit me to say that at no time have I felt a greater desire to see the boys placed in our care accumulate a high grade kit of tools, than right in the present school year.

Of course, some will say, after reading the foregoing statement, "I have been encouraging this sort of thing for a long time." A good many have, and those who have dwelt on this thing at intervals, have found



CARPENTER'S TOOL CHEST

that by building up real joy and pride in the ownership of a high grade set of tools, we are coming closer than ever toward developing the type of individual that best fits into the scheme of industry today.

While we are hammering away at this bit of common-sense philosophy with our present boys, there is being prepared a vast army of young workmen who, through their companionship with the boys we now have, are developing the proper respect for and love of good tools.

My plan this year has been as follows—many of the young lads indicated for and received one or more high grade carpenter tools on the Christmas day just passed. I have always been ready to recommend good tools to parents anxious to buy, and throughout the year the tool chest has been given an important place in our shop course of study. It is this that I have in mind also in speaking of tools, for it necessarily follows that high grade tools are well deserving of a permanent box for their constant safe keeping. So, I am submitting the design and constructional details of the two-saw tool chest we are building at present.

The accompanying bill of material gives the name, number, and size of all pieces, and the drawing gives the assembly dimensions. This chest is worked up to handle a 5½-point rip saw and 10 or 11-point cross cut. For a 5-point rip saw, the total length inside of box must be extended to at least 33½".

For a chest designed for a 5-point rip saw and a 10 or 11-point hand saw, the standard level will rest nicely parallel with the sides of the box, and the standard framing square will fit nicely in the box. But for the popular 5½-point rip saw chest, with trays as large as shown, the standard level must rest crosswise of the bottom. The squares must be of the 18" blade type. The trays can be made narrower, however, to accommodate a standard framing square if desired.

The objectionable feature of pulling trays out, and upsetting them, or forgetting them is gone. One lower tray is stationary, made the size of two rows of empty tobacco cans in which brads and screws are kept safely and separately. The second tray is made to slide toward the right and here tools which are frequently used are stored. The top tray slides beyond the second and in it are kept articles constantly in use. The fact that the trays slide toward the right-hand of the box is not a conflicting arrangement, for this is very seldom filled up to a height to interfere with the movement of the trays.

The glue joints on the undersurface of the top and inside the bottom are strengthened with corrugated fasteners.

The track scheme for the tray is given in the assembly drawing. Before fastening the one long runner permanently in place, make necessary cuts at both ends of second tray, as shown also by the accompanying drawing.

Bill of Materials for Carpenter's Tool Chest

Name	No.	Th.	W.	L.	Material
Sides	2	¾"	11⅝"	32 "	Pine
Ends	2	¾"	11⅝"	14½"	Pine
Top	1	¾"	16 "	32 "	Pine
Top—front ledge	1	⅝"	1½"	33⅜"	Pine
Top—end ledge	2	⅝"	1½"	16⅝"	Pine
Bottom	1	¾"	16 "	32 "	Pine
Lower Tray—S	2	½"	4 "	14⅜"	Pine
Lower Tray—E	2	½"	4 "	6⅝"	Pine
Lower Tray—B	1	½"	7⅜"	14⅜"	Pine
Center Tray—S	2	½"	3 "	14⅜"	Pine
Center Tray—E	2	½"	3 "	6⅝"	Pine
Center Tray—B	1	½"	7⅜"	14⅜"	Pine
Upper Tray—S	2	½"	1⅝"	14⅜"	Pine
Upper Tray—E	2	½"	1⅝"	6⅝"	Pine
Upper Tray—B	1	½"	7⅜"	14⅜"	Pine
Saw Cleats	2	⅞"	⅞"	5 "	Maple
Base—Saw Button	2	⅞"	1 "	1⅝"	Maple
Saw Button	2	¼"	⅞"	1⅝"	Maple

When this tray is in place and the long runner is fastened down, it will be impossible to lift out the second tray. No partitions are shown in the drawing of the trays, for these must be arranged to suit individual needs.

We have found that one long strip attached to inside surface of the right hand end of box in which holes have been drilled will admit the drills, but the shank makes an ideal way to keep drills together. A small lid hinged to the inside of the right end, and fitting down over the shanks of all these drills, will always keep the drills in place regardless of whether the chest rests on its base, or is tipped up on end for economical storing or convenient handling.

SIOUX CITY CLASS REBUILDS CARS

Emmett Frickie, Assistant Director of Auto Mechanics, Sioux City, Ia.

The boys in the auto mechanics classes at the Central High School, Sioux City, Iowa, have recently completed three cars as a part of their regular course. This novel method of instruction was inaugurated two years ago when they built one racing car. The plan was such a success both from the standpoint of the students and the school officials that it was decided that three cars would be built the following year.

A leading auto salvage firm of the city agreed to furnish all the material to complete the car, using a Grant, Chevrolet, and an Essex as foundations from which to work and the project was started at once. The old cars were torn apart and inspected, replaced or repaired as needed, and after a period of about five months began to take the form of peppy run-abouts.

The entire project was the work of the students from the time the old cars were brought into the shop until

ROADSTERS MADE BY THE AUTO MECHANICS CLASSES OF THE CENTRAL HIGH SCHOOL, SIOUX CITY, IOWA.

they were run out on their own power, capable of speeds from 80 to 85 miles an hour.

This method of instruction served to keep the boys interested and at the same time gave them a good, practical course in auto mechanics. In addition to experience gained by the boys that built the cars they were sold at a profit by the salvage firm.

A STUDY OF RESULTS OBTAINED IN 8-B OCCUPATION CLASSES, JACKSON, MICHIGAN

The present article is a study of results obtained in the occupation classes at Jackson, Mich. The study covered a total of 250 students, and was conducted by means of a questionnaire. The study which proved valuable to the school authorities in revealing difficulties and advantages, also made it possible to improve the teaching methods. The results show that the children took an interest in the work and in spite of an aversion to the work in an earlier semester, they made a creditable showing. The report is divided into eleven parts and is followed by a general summary of conclusions.

1. What part of the study of occupations did you find most interesting?

A. Agriculture 13, all 11, none 2, advertising 1, aviation 2, banking 1, building trades 8, commercial 4, dentistry 1, engineering 1, first part of book 5, last part 1, fisheries 1, forestry 2, government work 1, Jackson 26, law 1, machinist 1, medicine 1, manufacturing 6, millinery 1, newspaper 3, notebook work 3, nursing 10, personal qualifications 23, physical education 1, printing 5, professional 40, railway mail clerk 1, salesmanship 1, teaching 5, transportation 3, writing final report 18.

2. What did you find least interesting?

A. Agriculture 18, none 35, advertising 1, banking 5, building trades 22, commercial 9, dentistry 5, don't know 3, first part 11, last part 8, fisheries 5, forestry 5, government work 9, Jackson 1, law 4, machinist 1, medicine 3, manufacturing 17, mining 2, newspaper 1, notebook 3, nursing 4, personal qualifications 2, printing 6, professional 7, preparation of lesson 1, railroad work 1, shop work 1, teaching 1, transportation 3, writing final report 5.

3. What can you suggest to make it more interesting?

A. Don't know 23, nothing 11, couldn't be more interesting 4, interesting enough 7, allow more time, meet every day 8, have double periods 3, have debates 1, have separate classes for boys and girls 2, study Jackson first 4, more visits to industries 10, change order of textbook 8, have text in story form 3, have more class discussions 7, have talks by those engaged in the industry 2, more newspaper clippings 3, write report of chosen occupation first 2, omit reports 2, omit notebooks 1, class choose what to study first 1, tell about occupations of friends or relatives 2.

4. Have you found the work more interesting since your report?

A. Yes 147, no 27, no difference 17, worse 1, somewhat 6, I think so 1, did not answer 18.

4a. Have you understood it better?

A. Did not answer 11, yes 145, no 23, no difference 18, a little 3, don't know 1, worse 1, I think so 1.

5. Of what value was it to you to write that report?

A. "Great value, I learned about what I hope to do in the future" 16; "Made me find out whether I would like that occupation" 5; "Made me decide that I do not want to follow that occupation" 7; "Helps one to choose an occupation" 21; "Very interesting, showed what I did not know about it" 18; "I learned more about the occupation" 35; "Much value, made me think about occupations" 8; "Made the occupation clearer" 6; "I learned a lot about Jackson" 2; "One learns how to deal with people" 1; "I learned how to study" 1; "Made me interested in occupations" 4; "I learned the disadvantages of the occupation" 3; "Does much good, I learned many things" 5; "Discovers your ability" 2; "Gave me more interest in work" 2; "Shows what work is" 4; "Shows both sides of occupations" 1; "Shows what the requirements are" 10; "No value" 13; "Not much value" 3; "Don't know" 5; "Gives you general information" 7; did not answer the question 27.

6. Of what value to you is the study of occupations?

A. "Great value" 16; "Some value" 1; "Not much" 3; "Don't know" 17; "Helped me learn about different kinds of work and people" 44; "Helps you choose a suitable occupation" 39; "Shows me what I wouldn't like about it" 1; "Helps you prepare yourself for life" 15; "Shows you the requirements for different work" 12; "Without it you wouldn't plan to fit yourself" 1; "Shows you what to study in high school and college" 3; "Shows you how to get a job" 6; "Helps you get the kind of work you will like" 2; "Gives you general information" 10; "Gives me greater respect for work" 4; "Gets one interested in work" 1; "Makes you appear intelligent in public" 1; "None, as I had already decided what to do" 1; "Made me stop and think" 2; "Helped me to know my own city" 2; didn't give an answer 21.

7. Did you enjoy the study of your own city?

A. Yes 186, no 2, not very much 8, did not answer 13.

8. Which of your present subjects do you like best?

A. English 29, history 38, mathematics 33 occupations 2, science 7, gymnasium 8, Latin 4, French 4, cooking 12, shop 20, home mechanics 1, mechanical drawing 2, sheet metal 1, literature 1, drawing 2, music 1, typewriting 1, arts and crafts 4, printing 4, likes all 16; total, 210.

9. Which of your present subjects do you like least?

A. English 44, history 45, mathematics 23, occupations 31, science 1, gymnasium 4, Latin 5, French 3, shop 1, home mechanics 1, arts and crafts 1, geography 2, agriculture 2, penmanship 1, sewing 1, don't know 6, none 16; total, 188.

10. Do you like the study of occupations?

A. Yes 116, no 38, indifferent or "liked some parts "37. Total of 191 answered the question.

11. Did some one tell you before you reached the 8B grade that you would find occupations hard and that you would not like it?

A. Yes 116, no 78. Total answers 194.

A RADIO EXCHANGE DAY

The boys of the Lane Technical High School, of Chicago, felt so gratified over the results of their first "radio exchange day" that they have decided to make it a regular monthly affair. Boys that had parts for sale were on hand to demonstrate their goods and to answer questions.

RADIO EXCHANGE DAY MAKES A HIT WITH THE BOYS AT LANE TECHNICAL HIGH SCHOOL, CHICAGO, ILL.

Other radio enthusiasts who thought they would like to pick up additional parts at a bargain made a point of being on hand at the appointed hour of 2:30 when the regular classes were dismissed. Several of the benches in the big wood shop were roped off and used as display tables by the young merchants. As a result of this sale, new owners were found for a large number of radio receivers, a few speakers, and such parts as condensers, audio transformers, rheostats, jacks, sockets, potentiometers, and dials. "For Sale" and "Wanted" lists are prepared for the sales so that the boys can be of best help to one another.

NEW BOOKS

Mathematics and the Machinist's Job

By Frank Cushman. Cloth, 226 pages. Price, $1.75. John Wiley & Sons, Inc., New York City.

This book outlines a complete course in arithmetic and geometry as applied to the problems which the machinist must solve in the course of his ordinary occupation. It devotes considerable time to linear measurements and those simple arithmetical problems which arise from the use of the circle, micrometer, gearing screw threads, and the index head. The second part is almost entirely devoted to plane and solid geometry of a very necessary type in which each principle is discussed in relation to practical applications of value in machine shop practice.

Art in Every Day Life

By Harriet Goldstein and Vetta Goldstein. Cloth, 466 pages, illustrated. The Macmillan Co., New York City.

This book discusses and illustrates the principles of art as applied to pictures, furniture, room arrangement, buildings, and clothing. As an advanced text for classes of girls, it is complete, practical, and full of common sense suggestions which can be carried out in the middle class home.

The A B C of Iron and Steel

Edited by A. O. Backert. Cloth, quarto, 416 pages. Price, $6. Illustrated. The Penton Publishing Company, Cleveland, Ohio.

This is the fifth edition of a book which is generally considered the most authentic general work on our greatest basic manufacturing industry. The nineteen authors who have contributed the twenty-seven chapters are all outstanding experts and have described in simple, concise language the typical and significant groups of processes in the conversion of iron ore into finished forms of iron and steel.

The various trades and occupations which are engaged in the manufacture of iron and steel products have become so diversified and specialized that no one man knows more than a very small group of facts concerning the material he handles. This fact has been recognized by the publishers and editors and is the reason why so large a number of writers has collaborated in the preparation of the book. The opening chapters describe the various types of iron ore and the methods of mining, testing, and transporting ore. The making of coke, and its by-products

is taken up. Separate chapters then discuss the manufacture of pig iron, wrought iron, crucible Steel, bessemer steel, open hearth steel, electric steel, the various alloy steels. The secondary manufacturing processes of converting the various kinds of steel into wire and rods, shapes, merchant bars, rails, sheets, tin plate, and tubular are described. The making of all kinds of castings is finally taken up. Various appendices add statistics and directories of producers and manufacturers.

For the school library the book will make a nearly ideal reference book. It is perhaps more elaborate and complete than necessary, but its style and interesting illustrations, tables, and diagrams will strongly commend it.

The Cleveland Plan for Apprentice Training

Prepared by Mr. Howard L. Briggs and J. E. Fintz, of the Department of Vocational Arts and Practical Arts Education, Cleveland, Ohio.

This document outlines the plan adopted by the Cleveland school department for teaching apprentices in carpentry, brick laying, electrical construction, plumbing, painting, auto mechanics, machine shop, and messenger service. It is notable because it recognizes first, the conditions and needs of the various trades which predominate at Cleveland and second, because it adjusts the education of the apprentices very completely to the special situations in each of the trades. It is notable, too, because it sets up machinery for administering successful apprentice instruction and causes the employers, the trades' unions, and school department to share mutually in the development and administration of the program. The present document outlines the entire plan and adds the typical indenture contracts, job instruction sheets, and details concerning the organization of classes.

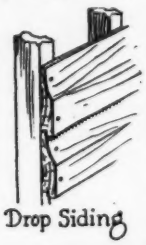
The Cleveland plan strikes us as the most flexible and most readily adaptable to meet conditions in large and middle sized cities where there are large variations in the necessities of the various trades and organizations.

INDUSTRIAL ARTS VOCABULARY

F. S. Crispin, Philadelphia, Pa.

Draw Knife — A wood-cutting tool having a long, narrow blade, attached at the ends to two handles, which stand at right angles to it.

Dredge — A machine for removing mud and sand from the bed of a stream or harbor by scoops or by suction.



Drop Siding—(Arch.) A type of weather board used on the exterior surface of frame buildings. Also called novelty siding.

Dross—The scum, oxide, and other impurities which are skimmed off the top of molten metals, or which accumulate in the head or in the riser of moulds.

Drying Oils—Certain vegetable oils, which become dry and solid on exposure to the air. Linseed oil is a very good example.

Eaves—The projecting edge of a roof.

Eccentric rod—The rod which connects the eccentric with the valve mechanism.

Effervescent — Giving off bubbles of gas.

Elastic—The condition which permits of a deformation when force is applied and a return to original shape on the removal of the force.

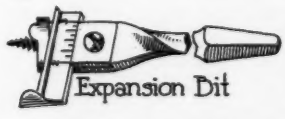
End Play—The play at the end of a revolving part, i. e., play in a longitudinal direction.

Entatis of a column— (arch)—The narrowing toward the top in order to avoid the appearance of its being wider at the top.

Equal Forces—Forces which act in opposite directions and balance each other.

Equilibrium—Perfect balance.

Exhaust Pipe—The pipe which carries away the exhaust steam from the exhaust port from an engine cylinder.



Expansion Bit — A boring bit having a cutter or cutters, in such a way as to permit radial adjustment to enable one tool to bore holes of different diameter.

Extending—To stretch out; to prolong in any direction.

Feather Edge—A keen edge; tapering off to nothing.

Felloe—The rim of a wooden wheel.

Ferrules—Rings or bands of metal, as in the end of a cane; rings enclosing and confining the wood around the tangs of edge tools to prevent splitting.

Field Magnets—The electro magnets by which the magnetic field of force is produced in a dynamo.

Finial (arch)—A terminal part pointing upward; an ornament at the top of a spire or steeple.

Fine Feed (Mech.)—The opposite of coarse feed—a feed minute in quantity.

F. A. O.—Finish all over. A notation frequently used in mechanical drawings.

Fire-brick—Brick made to withstand the effects of great heat.

Firmer Tools—The ordinary short chisels and gouges of wood workers used in bench work.

Fittings—Small parts, or attachments to an engine, boiler, or machine. Especially applied to boiler fittings, also to various pipe sections.

Flanged Nut—A nut having a broad flange, as a part of it, turned flush with its bottom face. It is used instead of a separate washer.

Flanks—The side or lateral portion of anything; the sides of the gear teeth lying below the pitch line (eng.); the sides of an arch (arch).

Flat molding (arch).—Thin, flat strips used for finishing woodwork.

Flexible ball coupling—The flexible ball coupling consists of two discs, attached to the shaft ends, and hollowed on their faces to encircle a ball placed between them.

Fluid—A body or substance which yields to any pressure imposed upon it from without, and which cannot retain its form without being contained.

Flue (arch).—A long, vertical groove on the face of a column.

Fly Cutters—Cutters which are set in a cutter block or chuck held in a lathe or other machine, and used for shaping the ends of the rods or shafts.

Foci—The centers from which the end curves of elliptical figures are struck. They are set in the major axis.

Foot Lever—One worked by the pressure of the foot.

Force Fit—A fit accomplished by force with the result that the parts so joined become a unit.

Fore Plane—A plane between a jack and a smoothing plane in size.

Forming Tools—Tools with their cutting or working edges shaped like the form to be produced in the work. Often applied to any special tool used to facilitate a mechanical operation.

Foundation Bolts—Bolts used for holding down or anchoring machinery or structural parts to the foundation on which they rest.

Frame Work—A skeleton structure or frame about which something is to be built.

Fret—Ornamental work done in relief.

NOW, ARE THERE ANY QUESTIONS?

Drying Oils

Q. 606. Can you tell me what Sipe's drying oil is, and where it is manufactured? It is a paint oil, but I do not know whether it is boiled linseed oil or not.—G. A.

A: Sipe's Japan oil, which is manufactured by J. P. Sipe & Co., of Bridgeville, Pa., is an exceedingly fine oil, analogous in many respects to boiled oil which has been widely imitated but never equalled. When used in varying quantities from a pint per gallon of prepared paint up to a full batch mix of straight Japan oil and pigment, it produces a very fine grade of film seldom equalled by a straight linseed oil either raw or boiled. The gloss, spread, and opacity of the paint are greatly augmented when each gallon of linseed oil is reenforced with one quart of Sipe's japan oil.

When outside spray work is being done in cool, moist, or cold weather, a paint based entirely on Sipe's japan oil will stick, spread, and flow out from the gun without any tendency to creep or crawl as frequently occurs with the usual straight linseed oil paint.

Of course, the use of this material precludes the necessity of the addition of the usual japan driers. Where an outside paint with a very high gloss and great durability is desired, the usual linseed oil should be reenforced with a pint or quart of Sipe's enamel oil. In these days when the air is highly charged with manufacturing gases, ammonia fumes, and the unseen discharges from high power electric lines, the need of this type of material as a direct reenforcing agent is very imperative and as such is highly recommended.—R. G. Waring.

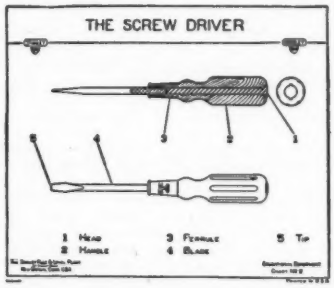
BUILT TO STAND ABUSE

STANLEY "Hurwood" Screw Drivers

THE cross-section at the right shows the sturdy, durable construction of Stanley "Hurwood" Screw Drivers.

The blade, shank and head are formed of one piece of specially treated steel. The shank passes through the handle and the ferrule is pinned, as shown in the picture. The handle cannot possibly get loose, turn or come off.

The blades on all Stanley Screw Drivers are tempered and have properly designed tips that do not slip out of the screw slots. The handles are fluted to aid gripping.



THIS CHART WAS MADE TO HELP THE BUSY INSTRUCTOR

The use of the above chart will save considerable time and aid materially in instructing the pupil in the construction and nomenclature of the tool. This chart and others on the plane, chisel, hammer, common joints, try square, etc., are free for classroom display. Send for them today if you have not been supplied.

We make a complete line of screw drivers for all kinds of work, including electricians' and cabinet makers'. In the latter design the tips have the sides parallel to enable the worker to follow a countersunk screw. This complete line is shown in Catalogue No. 34.

The Stanley Catalogue No. 34 should be in the hands of every Manual Arts or Vocational Supervisor or Instructor. It lists and shows pictures of over 1500 items, as well as detailed drawings of their construction and adjustment.

In addition, the appendix gives a number of tables covering subjects pertinent to woodworking.

You should have a copy of Catalogue No. 34 by all means. Send for yours today.

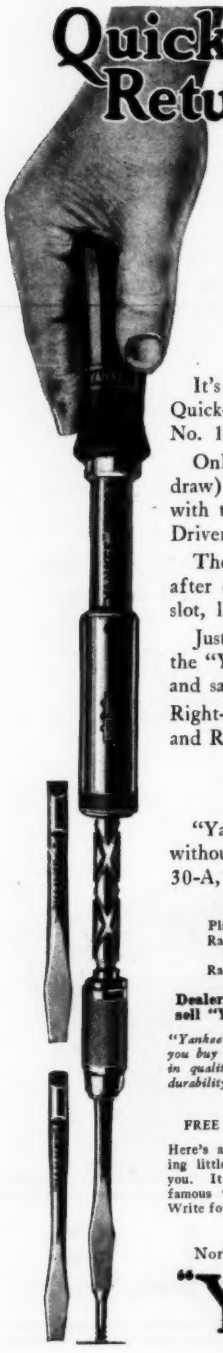
THE STANLEY RULE AND LEVEL PLANT
Educational Department, New Britain, Conn.

STANLEY
S.W.

STANLEY TOOLS

STANLEY EQUIPMENT IS STANDARD EQUIPMENT

Good Schools Deserve "Yankee" Tools



Quick Return!

The Live Spring in the Handle Makes "Yankee" No. 130 the Quick-Return Spiral Screw-Driver

It's like play to work with "Yankee" Quick-Return Spiral Ratchet Screw-driver No. 130-A.

Only one hand is necessary to drive (or draw) screws in the most difficult places with this "Yankee" World-Standard Spiral Driver.

The spring in handle brings handle back after each push and keeps blade in screw-slot, leaving one hand free to hold work.

Just push! The spring in handle and the "Yankee" spiral do the work for you—and save your time.

Right-hand Ratchet, Left-hand Ratchet and Rigid. Three sizes of bits.

No. 130-A. Standard Size
No. 131-A. Heavy Pattern
No. 135. Light Pattern

"Yankee" Spiral Ratchet Screw-drivers, without the Quick-Return feature, No. 30-A, No. 31-A, No. 35.

Some other "Yankee" Tools

Plain Screw-drivers
Ratchet Breast and Hand Drills
Ratchet Bit Braces
Automatic Feed Bench Drills
Automatic Push Drills
Vises, Removable Base

Dealers everywhere sell "Yankee" Tools

"Yankee" on the tool you buy means the utmost in quality, efficiency and durability.

FREE TOOL BOOK

Here's a mighty interesting little Tool Book for you. It tells all about the famous "Yankee" Tools. Write for your copy today.

North Bros. Mfg. Co., Philadelphia, U. S. A.

"YANKEE" TOOLS

Make Better Mechanics

NEWS AND NOTES

Hold Fourth Yacht Regatta at Los Angeles. The fourth annual miniature yacht regatta was held June 19th, at Westlake Park, Los Angeles, California. Winners of the 34 inch and 36 inch class and models measuring under 34 inches, were awarded large silver trophies. Mr. C. A. Kunou, supervisor of manual training, directed the preliminary class work in construction.

Typographic Contest Held in New York. Students of printing in New York, New Jersey, and Connecticut recently entered into the typographic contest conducted in connection with the second annual educational exposition, conducted in New York City. The contest was conducted under definite specifications and rules. The students were asked to set up a cover page, to be printed in one color, on white stock, and the form to be set entirely by hand, with individual types. Each contestant was permitted to use his own judgment in the choice of type faces, ornamentation, borders, and general arrangement.

The work was performed entirely by the students without assistance, or criticism from the instructor, and no contestant possessed more than two years' experience as a student in the printing school. The competition was judged on the basis of fitness, simplicity, legibility, harmony, balance, and appropriateness of ornamentation. The winners were as follows:

First place: Cornelius Bowen, Snyder Junior High School, Jersey City, N. J., prize of ten dollars in cash.

Second place: Louis Baum, Empire State School of Printing, Ithaca, N. Y., five dollars in cash.

Third place: Robert Talbot, Snyder Junior High School, Jersey City, N. J., prize, certificate of merit.

Fourth place: George Bunnell, Boardman Trade School, New Haven, Conn., prize, certificate of merit.

A Manual Arts Building. The city council of Rochester, N. H., has voted to erect a manual arts building to be devoted to the mechanic and domestic arts.

Form New State Association. The Illinois Manual Arts Association has been discontinued. As a means of combining this specialized field of educational work with other fields of practical work, it has been decided to effect a new state-wide organization, to be affiliated with the American Vocational Association.

Tryout Courses in the Junior High Schools. The tryout courses offered in the seventh and eighth grades of the Junior high schools, Hamtramck, Michigan, give the boy a broad experience in many phases of industrial life and types of service. They develop in him proper attitudes of service, safety first, care of equipment, cooperation, and reduction of waste that react for the benefit of society as well as for the boy.

A working knowledge of several branches of industry gives the boy a comparative advantage over the boy who has not taken the work. The boy enjoys meaningful experiences that tend to give him appreciations and attitudes toward people and toward the work with educational values.

The tryout experience, together with occupational study, is of help to the boy in choosing his future vocation. It gives a background for individual counselling and gives contact with numerous activities which inspire the boy in the selection of a vocation.

Courses Organized on General Shop Plan. The Indiana Normal School at Terre Haute, Indiana, which closed its school year in June, has for the last year conducted its industrial arts courses on the general shop plan. For the junior high school industrial arts classes, the work comprises woodwork and electricity for the seventh year, and drawing and forge work for the eighth year. For the senior high school classes, the work comprises mechanical drawing, foundry work, concrete construction, wood turning, and woodwork for the first year, and mechanical drawing, sheet metal work, carpentry, pattern making and woodwork for the second year.

Cooperative Industrial Course. The administrative department of the Kearny, N. J., school system has outlined a course of study providing for a cooperative industrial course and a diploma at the end of the four years.

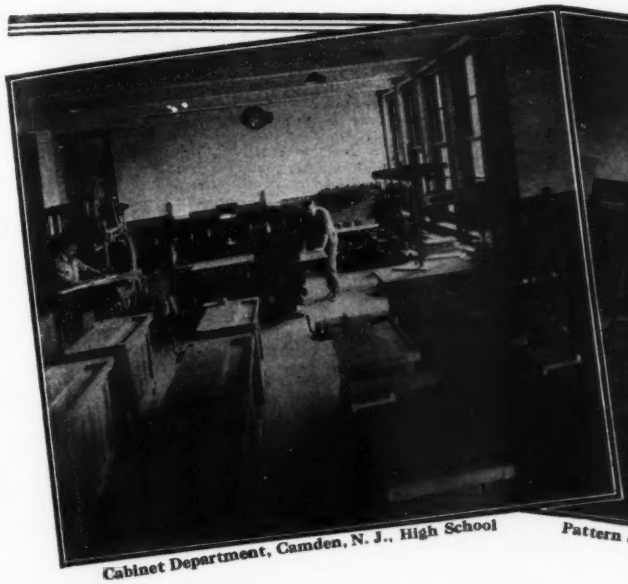
Under the plan, a student may be employed in one of the local shops, at the same time pursuing a course of study in the schools. The student is employed by the industrial plant and receives pay for his services, but he is also under the jurisdiction of a member of the faculty, who acts in the capacity of a coordinator. With the completion of the four-year course, the student receives a diploma in applied mechanics.

The plan provides for groups of students, one student working in the shop while another attends school, so that the shop work goes on smoothly without interruption. The plan is a substitute for the old apprenticeship system, since it places the student under expert supervision during the period of instruction. It prevents the withdrawal of many boys from school, by giving them an opportunity to pursue their chosen subjects, learn a trade, and at the same time, earn money for their support while in school.

Vocational Agriculture Course. To fit the education of the pupils to the life of the community, the Madison, N. J., board of education has approved a vocational agriculture course for the junior and senior high schools. Rose culture and general greenhouse work will be the basis around which the course will be built.

Continuation School Program. The continuation school building program for New York City includes new school buildings for the east side, for Queens, for Jamaica, and Brooklyn, as well as the use of a part of the building to be used jointly by the College of the City of New York and the continuation schools. In Harlem, a continuation school is planned for girls in the Heckscher Foundation Building, which has facilities for

(Continued on Page 24a)



Cabinet Department, Camden, N. J., High School

Pattern Shop

The Importance of Correct Methods of Shop Practice

A teacher who strives for correct methods of shop practice knows he can reach that ideal only by the use of real industrial machines. Such a man is Mr. Harley E. Smith, Instructor in Woodworking in the Camden High School, Camden, N. J.

The two illustrations at the top show sections of the Pattern Shop and the Cabinet Department in this school and the following is a list of Yates-American machines in each.

CABINET DEPARTMENT	PATTERN SHOP
No. 5 Sander	No. 13 Pattern Maker's Lathe
36" Band Saw	10-12" Speed Lathes
Hollow Chisel Mortiser	36" Band Saw
Self-contained jig saw	No. 2 Surfacer
1 - Speed Lathe	12" Jointer
	No. 20 Universal Saw

Camden, N. J. High School

MR. HARLEY E. SMITH
Instructor of Manual Training

The tools of school are the tools of life

YATES-AMERICAN MACHINE COMPANY

EDUCATIONAL DEPARTMENT

ROCHESTER, N. Y.

Why are some drilled holes larger than the drill?

Incorrectly Ground Lips. In this case the angles of the two lips are different. As a result the cutting edge on your left is doing most of the work while the one on the right is removing only a small portion of metal. Note that the hole is *larger than the drill.*

Incorrectly Ground Lips. Here the *angles* of the lips are equal but their *lengths* are different. Here again the hole is much larger than the drill and the punishment to the tool is terrific.

Incorrectly Ground Lips. Here the angles of the lips are unequal and the lips are of different lengths. Note the effect on the hole.

QUOTING from this handy Handbook for Drillers, the answer is:—"If we get the 'Point' in the center, but different angles on the cutting edges—or, suppose we get equal angles on the cutting edges—but, on measuring, we find the lips are of different lengths—the result will be a hole actually larger than the drill."

The importance of correctly ground lips, and correct angles on the cutting edges, together with a host of other equally valuable information about drills and drilling practice, are thoroughly covered in this 48-page textbook.

Handbook for Drillers is used by hundreds of technical, vocational and manual training schools and colleges because it is the complete textbook on the subject.

To help further a better knowledge of twist drills and how to use them properly, we are always glad to send copies of the Handbook to school directors and instructors in any reasonable quantities for the use of their classes.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND NEW YORK-CHICAGO-LONDON

TRADE MARK REG. U.S. PAT. OFF. AND FOREIGN COUNTRIES

Manufacturers of Carbon and Cle-Forge High Speed Drills for every purpose; "Mezzo" Super-Carbon Drills; Hand, Jobbers' and Shell Reamers; "Peerless" High Speed Reamers; "Paradox" Adjustable Reamers; "Quick-Set" Reamers "Spirex" Machine Taper Pin Reamers; Chucking Reamers for Turret Lathes; Counterbores; Countersinks; Sockets; End Mills; and the "Ey-Ot" Screw Extractor.

(Continued from Page 22a)

the usual types of instruction, with a swimming pool, gymnasium, auditorium, and other features. In the fall the city will use the Poppenhausen Institute in College Point, L. I., for continuation school purposes to cover the isolated sections in Queens Borough. In Richmond, the schools will use Public School No. 9, which provides for the south and east shore of Staten Island.

Industrial Teachers to Meet. The vocational, fine arts, and industrial sections of the southeastern division of New York State will hold their next meeting October 15th, at New York University. Mr. Gaston K. Wagar, chairman of the sections, is preparing the program to be given at the sectional meetings. It is planned to have one general meeting, to be followed by several sectional meetings.

Four-State Vocational Conference. The Four-State Vocational Conference, which will be held August 22nd to 27th, at West Chester, Pa., will present an attractive program, with speakers of state and national reputation. Speakers from the four states of Delaware, Maryland, New Jersey and Pennsylvania are represented on the programs for the different sectional meetings. In the section devoted to industrial education, attention will be given to the multiple activities of the general shop, to the place of home mechanics, to industrial arts education, and other live topics of interest. In the field of vocational industrial education, there will be reports of developments and trends from the various states. Attention will be given to section meetings, composed of specific trade groups, such as auto mechanics, machinists, plumbers, printers, related subject teachers, and others.

American Vocational Association to Meet. The American Vocational Association will hold its next meeting December 2, 3, and 4, at Louisville, Ky. A strong program is in preparation by Mr. E. A. Lee, president of the Association, with a number of attractive features included.

Pittsburgh Trade School for Girls. The Pittsburgh Trade School for Girls at Pittsburgh, Pa., has opened with an enrollment of one hundred girls. The courses include dressmaking, children's clothing, power sewing and special sewing, millinery, personal hygiene, preparation and serving of food, and child care and training.

Home Economics Classes Give Demonstration. In the senior high school at Johnstown, Pa., the students in the home furnishing classes, in cooperation with a local business house, gave a demonstration of their ability to furnish a living room suitably and economically. A fashion parade by the girls of the dressmaking classes demonstrated how they had helped with the family clothing budget, by making their own gowns.

General Shop Installed. An addition will be built to the Washington School at Bethlehem, Pa. The plans include a general shop with all modern improvements. At least six activities will be included in the work given—machine shop practice, electrical work, drawing, forging, woodworking, and sheet metal work.

Vocational Department in New Building. The vocational department at Hazleton, Pa., is housed in a new building which has been remodeled to meet the needs of the school shops. The building contains two stories and houses four shops comprising mechanical drawing, cabinet making, electrical work, and printing.

Trade Education at McKeesport. An excellent outline of a trade course in electricity was carried out the past year at McKeesport, Pa. Forty high school sophomores were enrolled in the course. Plans have been made for the establishment of a trade school to accommodate from 700 to 800 students.

Open a General Shop. With the completion of the senior high school at York, Pa., the continuation school will be housed in a larger building. The present plans call for a general shop for the boys and a cooking department for the girls.

Complete Vocational Survey. A city-wide vocational survey has recently been completed at Fresno, California. The survey was begun as a means of vitalizing the subjects and to effect a closer contact between the schools and community activities.

In connection with the plan, ten trades and industries have cooperated in the organization of courses in trade training. In some cases, the work will be pre-employment study, in others night school work, and for still others it is planned to offer part-time work. The ten trades represented are the carpenters, the plasterers, the printers, the sheet metal workers, the plumbers, the mill workers, the electricians, the painters, the auto-mechanics workers, and the bricklayers. Those represented on the committees planning the work are the craft employer, the union laborer, and the school system.

Construct New Tables and Bookcases. Seven reading tables and two bookcases were recently constructed for the parent-teachers' association of Pine Bluff, Ark., by the manual training classes of the city.

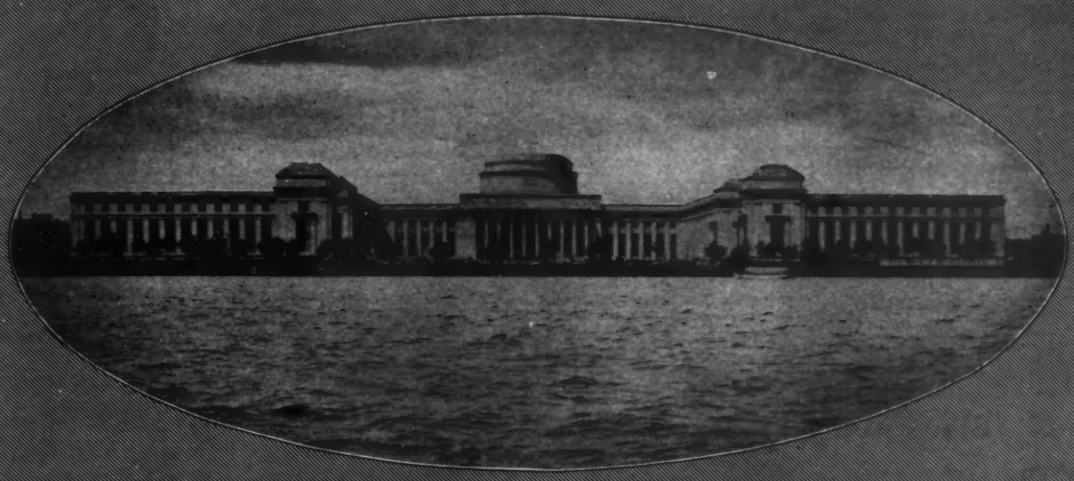
Vocational Class Started. A vocational class for mine and mill foremen was held at Joplin, Mo., for workers in the tri-state district.

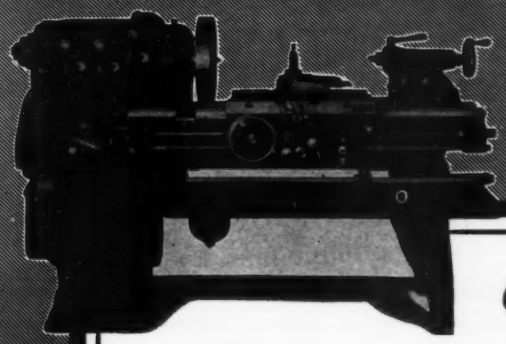
Will Teach Carpentry. Carpentry will be offered to boys in the manual training classes at Ashtabula, O., in September next. A number of small structures will be erected by the boys as practice work.

Establish New Trade School. A trade school for boys will be opened at Haverhill, Mass., with the opening of the fall term. The work will begin with sheet metal and will be gradually enlarged to meet increasing demands for trade instruction.

State Trade School Goes to Town. The district trade school at Manchester, Conn., has been deeded to the town. An appropriation of $125,000 has been made for the purchase of the trade school.

(Concluded on Page 27a)





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The Massachusetts Institute of Technology uses The

MONARCH Helical Geared Ball Bearing LATHE

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The prestige of this Institute—the corner-stone of Massachusetts' enviable system of vocational education — attracts students from the four corners of the civilized world.

In choosing the equipment for these students, the directors of the Institute must base their choice upon equipment that will give students the greatest possible amount of experience.

We are proud of the selection of the MONARCH Engine Lathe as a part of the Institution's metal working equipment — proud that it has been selected solely upon its merit, after careful consideration, as the type of equipment necessary for the high degree of training which Massachusetts "Tech" gives to its students—a training which has been so creditably reflected on the Institution by its graduates.

We shall be glad to plan your vocational metal working shop. Give us a statement of your requirements and let our Free Engineering Advisory Service plan your shop, giving you an accurate estimate of the entire equipment cost. This service is gladly rendered without charge.

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SHEET METAL WORK—as an Industry—its Value as a timely Industrial Vocation for School Shops — the Projects — Aims of the Course — Sheet Metal Working Machinery — Application, and other things you would like to know are fully covered.

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You don't have to shop around when you buy of us. We carry everything from a rivet to the largest machine used for this work.

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Kester Self-Fluxing Wire Solder to a large extent eliminates this difference through the convenience afforded by suppplying a scientifically prepared flux from tiny pockets within itself as it is used. "It requires only heat" eliminating the acid pot.

Send for a test sample and use it on your next sheet metal project.

KESTER *Acid Core* SOLDER

For general soldering on new or old work in the general shop, sheet metal shop, home mechanics shop, specify Kester Acid Core Wire Solder.

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Gentlemen:

Please send the following number of working samples:

.....Kester Acid Core Wire Solder

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The number of boys in our shops are:

General Shop.....Electrical.....

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Signed.....

Instructor in.....School.....

City..... State.....

KESTER *Rosin Core* SOLDER

For all electrical soldering and radio work specify Kester Rosin-Core Wire Solder. Absolutely non-corrosive flux.

(Concluded from Page 24a)

Manual Training Classes Complete Work. The manual training classes at Nebraska City, Neb., during the past year turned out more than 500 pieces of furniture. The work was equally divided between woodwork and wicker work and included such pieces as wicker lamps, smoking stands and baskets, hall trees, cedar chests, medicine cabinets, and magazine racks.

Posters made in the classes of the Murray Hill School, Cleveland, O., have as their objective the elimination of accidents during the summer vacation period. The posters formed a traveling safety reminder exhibit and were made so that even the very smallest child could understand the safety message indicated in the picture.

The final unit of the central school at Wausau, Wis., is being furnished by the students of the vocational school. They built the furniture for the cafeterias, consisting of tables, serving table, all the sheet metal work in connection with the school kitchen, cabinet work, filing cases, etc. The work is said to compare favorably with the cabinet, sheet metal and steel work coming out of the best factories.

Reduce Size of Classes in Continuation Schools. Reduction in the size of classes in New York continuation schools has recently been recommended to the board of superintendents by Morris E. Siegel, director of continuation schools, and Franklin J. Keller, principal of the East Side Continuation School, in a report on vocational and part-time education in Massachusetts.

As a result of their visits to Massachusetts, the two administrators found that in all schools, the classes were uniformly small, no boys' class and only a few girls' classes exceeding fifteen students. They pointed out that the quality of work possible under these conditions is vastly improved. Giving 150 pupils a week to a teacher, they argued, creates an impossible situation in which both the teacher and pupil work to a disadvantage.

Blind Alley Jobs. The records of 500 boys and girls in the placement office of the Pittsburgh (Pa.) department of vocational guidance show that children between the ages of 14 and 16, with employment certificates, generally enter routine and "blind alley" jobs. Nearly three-fourths of the children who receive certificates, the records show, leave school at 14 years, and nearly half of such children do not go beyond the sixth grade in school. The work obtained by these children almost never prepares them for specific adult work, the labor turnover is great, and because of the loss of time between jobs, the children are generally idle from thirty to 45 per cent of the time.

Household Mechanics Equipment Installed. An extensive household mechanics equipment has been installed in the industrial education department of the State Teachers' College, Kearney, Neb. The trend of shop work in Nebraska has been toward household mechanics and Kearney has had difficulty in meeting the demand for teachers of this work.

Vocational School Graduation. The graduation exercises of the Vocational School, New Bedford, Mass., were held on July 2nd. Students were graduated from the household arts, machine shop, carpentry, electrical, automobile and power departments.

Exhibit School Work. An attractive display of the work of three of the practical departments of the Titusville, Pa., schools was held at the high school building on June 3rd. The articles on display included cedar chests, end tables, telephone stands, bookcases library tables, radio cabinets, writing desks, hall trees, buffets, footstools and sewing cabinets. Practically all of the articles were well made and compared well with the stocks carried in the local stores.

Nesting Boxes and Feeding Stations Constructed. The industrial arts classes of the Cincinnati (Ohio) schools recently undertook the project of making a large number of bird-nesting boxes and feeding stations to be placed in public parks and other places where birds congregate. Mr. E. W. Christy of the department cooperated with Mr. W. G. Cramer, president of the Audubon Society, in encouraging the work.

Thirty-eight thousand children of 14 and 15 years left school to go to work in 1924, in Massachusetts, according to the state child labor committee. About half of the children have finished grammar school. The committee declares that 41 states have a better record with regard to school attendance of Children between 14 and 15 than has Massachusetts.

Vocational Department Completes Projects. The boys of the cabinet-making department at Williamsport, Pa., have completed the making of small wooden jacks to be used in the automobile shop. They have also made standards for the numerous benches around the school. The junior and senior machinists and draftsmen have rebuilt an ending lathe and converted it into a center lathe for drilling holes. The machinists have constructed several arbor presses to be used in the machine shop.

New Summer School Plan Approved. The school board at Chanute, Kansas, recently approved a plan providing that manual training be offered as a part of the summer activities of the city schools. It is probable the plan will involve a two-month school, with a charge to cover the cost of tuition. Sessions will be conducted the same as during the regular session, the students paying for the material they use and the article that each student makes becoming his own property.

Trade Courses Suggested. Eight tentative courses for evening trade schools have been approved by the board of education at St. Joseph, Mo. The courses cover ten weeks with free tuition. Among the subjects are electricity, contracting, shop mathematics, radio mechanics, window decoration, sewing, bookkeeping, painting and decorating.

S'matter, Pop?

'S funny, once you've formed the habit of working with a Starrett Combination Square, you're absolutely lost when somebody gets away with it.

That's because of its great convenience, the number of different tools it replaces and the tremendous number of uses it can be put to.

When you stop to think that 7 distinct tools are replaced by the No. 94—a marking gage, a rule, a square, a miter, a depth gage, a height gage, and a level and plumb—it's easy to see what a hole its loss leaves in most men's kits.

And when you start to figure up the number of USES for this one tool—well, as one practical carpenter put it, "Every day and every job brings a wholly new use for this Combination Square.

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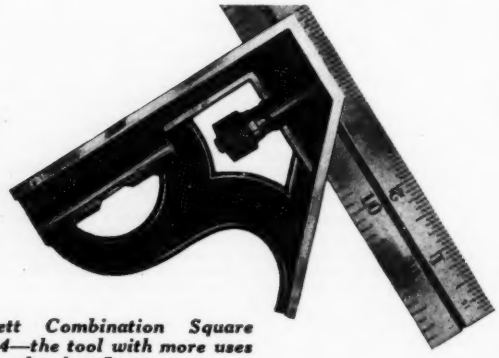

Starrett Combination Square No. 94—the tool with more uses than a dog has fleas.

Use Starrett Tools

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PERSONAL NEWS

Mr. Homer J. Smith was given the degree of doctor of philosophy by the University of Minnesota on June 14th. Mr. Smith will continue on the faculty as associate professor of industrial education.

Mr. Richard A. McGee, formerly on the faculty of Stout Institute, has accepted a position on the faculty of the University of Minnesota. Mr. McGee will have charge of industrial arts work in the University High School, and will undertake some lecturing in the department of industrial education. At the same time he will continue his graduate studies. Mr. McGee completed some special work at Stout Institute and received his B. S. degree at the University of Minnesota in 1923.

Mr. Joseph C. Park of Oswego, N. Y., has received the Master's Degree given by Syracuse University. The subject of Mr. Park's thesis was "Changing Conceptions of Education and Administrative Problems of Vocational Schools."

Mr. Harold W. Matthews teaches printing at the East Side High School, Aurora, Ill.

Mr. Kenneth O. Loveland will teach industrial arts at Baldwin, L. I., N. Y., beginning with September.

The honorary degree of Doctor of Science has been conferred by Stout Institute upon Mr. Lewis A. Wilson, of Albany, N. Y., and Mr. John C. Wright of Washington, D. C.

Both the recipients are leaders in the field of vocational education.

Mr. T. A. Butler, formerly director of industrial arts at Port Arthur, Tex., has retired from educational work after the completion of nineteen years of service. Mr. Butler will make his permanent home in Port Arthur.

Mr. L. E. Babcock of Pomeroy, Wash., has been reelected as head of the manual arts department for a third year.

Mr. Elbert C. Peterson has been appointed as manual training instructor at Belvidere, Ill.

Miss Mary K. Klepinger has been appointed head of the Smith-Hughes vocational home economics department at the Roosevelt high school, Kent, O.

Mr. L. H. Hubbard, on June 2nd, assumed his duties as president of the College of Industrial Arts, Denton, Tex. Mr. Hubbard succeeds Lindsey Blayney.

Interior Decoration. A class in interior decoration was offered for the first time this spring at Parsons, Kans. Much interest was shown in the work.

Hudson Valley Teachers Meet. The annual meeting of the Hudson Valley (N. Y.) Vocational Teachers' Association was held May 15th at Beacon, N. Y. Mr. George Brinckerhoff, president of the association, presided at both the morning and evening sessions. At the meetings, talks were given by Supt. E. D. Hewes, Mr. G. E. Hutcherson, Mr. F. O. Lowe, Miss Treva A. Kauffman, Mr. O. G. Furney, Miss Evelyn Nance, Miss Kauffman and Mr. H. A. Daniel. Mr. J. E. Dederick, of the Beacon part-time school, was in charge of the general discussion.

Apprentice School Planned. Plans have been made for the opening of an apprentice school at Alamosa, Colo., for apprentices of the D. & R. G. W. Railway. Among the subjects to be taught are mathematics, applied mechanics, shop practice, and mechanical drawing.

Vocational School Planned. Plans have been begun for the erection of a vocational school at West Allis, Wis. The building will be three stories high and will cost $100,000.

Attend Vocational Meet. More than 100 girls from high schools of the state of Washington attended the fourth vocational conference at Pullman.

TRADE PUBLICATIONS

Jorgensen Adjustable Clamps. The Adjustable Clamp Co., of Chicago, Ill., has issued its new Catalog No. 6, illustrating and describing its adjustable hand screws, cabinet, carriage and machinists' clamps, and "Little Giant" clamp fixtures.

The firm has announced the acquisition of the patterns, tools, stock and good will of the clamp manufacturing business of the Youngstown Sheet & Tube Co., which will hereafter be manufactured by them. The superior quality of the carriage and machinists' clamps put out by the Youngstown firm has been recognized and will be assurance to buyers of the real value in these products. The enlargement of the line of clamps by the addition to these items will be of considerable advantage in the effort made to maintain an economical source of supply for first quality tools of this nature.

The firm calls attention to its new location at 417 N. Ashland Ave., Chicago, where its offices will be housed in new and larger quarters, and where it will be able to give the purchaser still better service.

Pease Blue Printing Machine. The C. F. Pease Co., of Chicago, Ill., has issued a pamphlet illustrating and describing the Pease Junior blue printing machine and Pease sheet washer. The Junior blue printing machine has been designed for use in drafting rooms where only a small quantity of blue prints is required, or where emergency prints are wanted in a hurry. It will be found valuable for use in vocational schools, high schools, and junior high schools.

The machine consists of a half cylinder of glass, supported in a metal frame, which is coated with acid proof paint. The tracing and the blue print paper are held in contact with the glass by a curtain mounted on a spring roller. It is equipped with a Pease Type P arc lamp, which is provided with a satin-finished aluminum reflector and consumes seven and one-half amperes on 220 volts direct, or alternating current and ten amperes on 110 volts direct or alternating current. The drop of the lamp is controlled by a patented cylindrical oil control and is

(Continued on Page 30a)

Have You a Little Paper in Your School?

The School News

A facsimile of the front page of a schoolpaper, such as may be published for the purpose of convincing parents of your children of the value of printing in connection with academic and vocational instruction in public schools.

VOL. 2 ANY COMMUNITY, ANY STATE NO. 1

The Value of Schoolpapers

WHAT the newspaper is to the general community the schoolpaper is to the school community. Both publications possess uncommon interest to their readers by the printing of news items, and both have the power of moulding public opinion. One influences mature minds; the other influences the youthful minds. Both are informative and highly educational. Especially is this latter statement true in the case of schoolpapers.

The schoolpaper has one distinct advantage in educational value—it is the product of its readers. To be successful it must represent the combined effort of every class in the school and be of interest to every student enrolled in those classes. The academic classes may be assigned the task of collecting news, preparing interesting articles, and revising the printers' proofs for errors in English construction, spelling and typography; the art classes may have charge of the illustrations and general typographic arrangements; the commercial classes may look after the business end of the publication, such matters as soliciting money for subscriptions or advertisements, making disbursements for paper, inks, etc. The actual work of type composition, imposition, presswork and binding will be done by the printing classes.

No other activity can combine into a single educational unity practically the entire facilities of the institution as does the schoolpaper.

With the installation of printing instruction in a school all the academic work is revitalized. English, spelling, arithmetic, grammar, and art will take on a different meaning to students who have hitherto regarded these studies merely as necessary evils. Taught in conjunction with printing, their great value as vital elements of education is realized.

Request us to send you a chart showing the "Mechanics of Journalism." It is free.

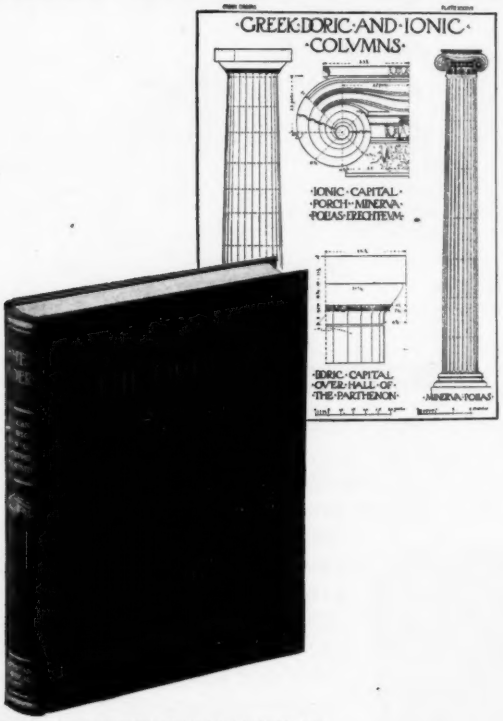
Information: The Education Department of the American Type Founders Company employs the services of professional educators, efficiency engineers and trained salesmen to aid you in establishing printing courses in your schools. With this Company the word "service" is spelled H-E-L-P.

For information write F. K. PHILLIPS, Manager, EDUCATION DEPARTMENT

American Type Founders Company

300 Communipaw Avenue, Jersey City, New Jersey

Important Text Material for the Teacher of Industrial Subjects



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By Frank A. Bourne, Frank C. Brown, and H. von Holst.
Price $3.00
"I think this work the most complete treatise on this subject I have ever seen. It is just what we have been looking for."
—**Katherine H. Scott,** Art Supervisor, West Chester (Pa.) Normal School.

ORDERS OF ARCHITECTURE, PORTFOLIO OF, PLATES,
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—**Wentworth Institute, Boston.**

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Price $1.50
"Am requesting my Supt. to order your Architectural Drawing and Lettering for my classes."
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FREEHAND AND PERSPECTIVE DRAWING.
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"I am using your 'Freehand and Perspective Drawing' as class text and am very much pleased with it. I consider it the best book I have seen so far and like its clear, simple way of dealing with the subject, the author sticking to his text and bringing out every detail. The pupil gets a straight, concise conception of every matter dealt with."
—**Andrew J. Moynahan,** Mech. Drawing Instructor, Lowell, Mass.

MECHANICAL DRAWING
By Kenison, Waite, McKinney. Price.....$1.50
"Please send me at once fifty copies of your "Mechanical Drawing."
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MACHINE DRAWING
By Charles L. Griffin. Price.....$2.00
"Your text on Machine Drawing is very practical and well presented."
—**Jennie L. Clark,** Supervisor of Art, White Plains (N. Y.) Public Schools.

WE ALSO PUBLISH OVER ONE HUNDRED ADDITIONAL VOCATIONAL TEXTBOOKS EMBRACING THE ENTIRE TECHNICAL FIELD.

Following are a few of the schools in New York State using our text material:

Buffalo Vocational Schools — **New York City Vocational Schools**
Rochester Shop School — **Schenectady Continuation School**
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Any of our Textbooks submitted to schools and teachers for examination ON APPROVAL.

Write for catalog and educational discount.

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(Continued from Page 28a)

provided with a quick brake automatic switch to cut off the light at any point.

The sheet washer has been designed for use with the blue printing machine and is of the same general construction as the larger machine. The Pease junior makes it possible to dispense with the use of an open bath tray, dripping prints and wet floors, and the prints are washed better and dried more quickly than when soaked in a tray. The color is intensified and exceptional non-fading qualities are obtained by the use of a five per cent solution of bichromate of potash. A small tray and a wide brush are supplied for applying the bichromate of potash to prevent the chemical coming in contact with the hands.

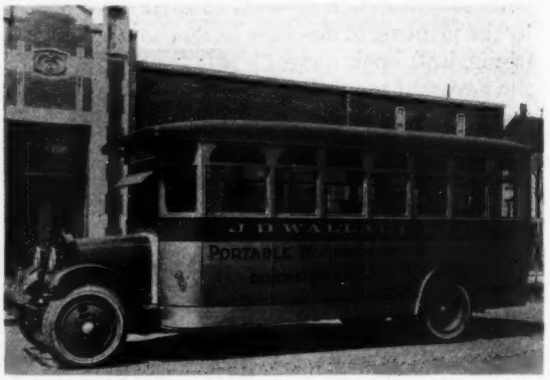
Information concerning the Pease Junior blue printing machine and sheet washer may be obtained by writing to the C. F. Pease Company at 813 North Franklin Street, Chicago, Ill.

A Catalog of Equipment for Sheet Metal Work. The Peck, Stow & Wilcox Co., of Southington, Conn., has issued its new Catalog S, describing its machines and tools for sheet metal work.

The catalog is devoted especially to the selection of equipment for sheet metal work, and to programs of study showing articles made to illustrate the processes in sheet metal work. It includes standard sheet metal equipment, bench layouts, and gives useful tables on the relative thickness of sheet metals, wire gauges, dimensions of tinners' rivets, and tin and sheet iron workers' circumference table.

Change in Firm Name. The Columbian Hardware Company, Cleveland, O., has changed its name to the Columbian Vise and Mfg. Company. The new name better describes the products of the firm, which include metal working and woodworking vises.

Interesting Demonstration Car. The accompanying illustrations show the interior and exterior views of the J. D. Wallace & Co.'s Demonstration Car, which carries samples of each of the portable and direct motor driven woodworking machines which the firm markets. A generator supplies 110 volt alternating current to operate the machines for demonstrations.



THE J. D. WALLACE & CO.'S PORTABLE WOODWORKING MACHINE DEMONSTRATION CAR.

INTERIOR OF THE WALLACE DEMONSTRATION CAR.

This Demonstration Car is used in calling on all classes of prospective users of Wallace machines, including woodworking plants, carpenters and builders, shipping rooms, maintenance departments, school shops, etc. It is also used in educational work among the salesmen of jobbers who sell the Wallace line of portable machines.

The Demonstration car is at present being used in Chicago, but will eventually travel through various sections of the country.

(Concluded on Page 32a)

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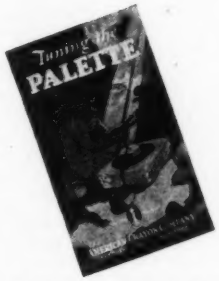

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(Concluded from Page 30a)

Standardization of Scientific and Engineering Symbols. Under the auspices of the American Engineering Standards Committee, a project has been undertaken which is expected to lead to the eventual standardization of scientific and engineering symbols and abbreviations. The committee includes a total representation of 31 trade, technical, and scientific societies. Among the societies taking part in the work as sponsors for the committee are The American Association for the Advancement of Science, the American Institute of Electrical Engineers, the American Society of Civil Engineers, the American Society of Mechanical Engineers, and the Society for the Promotion of Engineering Education.

The larger groups of the work outlined for early attention, upon which most of the subcommittes have been organized, and are at work, are the following: Mechanics and testing materials; hydraulics; heat and thermodynamics; photometry and illumination; aeronautics; mathematic symbols; electro-technical symbols and abbreviations, including radio.

The present plan is to concentrate upon those fields in which the need for unification is most pressing, or in which material that may underlie a future standard, is in existence, and can be readily put into form for study, circulation, and formal adoption, by the committee, its sponsors, and finally by the American Engineering Standards Committee.

Wood Finishing. A textbook on Wood Finishing prepared by its own corps of experts has been prepared by S. C. Johnson & Son of Racine, Wis., for the use of instructors and students. The text outlines the composition, purpose, and application of the most widely used wood finishing materials—fillers, stains, shellacs, waxes, enamels, and varnishes—and gives specific information concerning the Johnson products of each of these materials. The most valuable section of the text gives the procedure for doing a "typical stained and waxed or (varnished) job" such as is met frequently in school shops. The booklet will be sent free to any teacher or student.

Technical Education. Monograph No. 1. Issued by the Department of Public Instruction, Utica, N. Y. This pamphlet outlines the aims and methods of a four years' course in technical education in applied electricity in the Utica Free Academy. The pamphlet was designed, set in type, and printed by the department of printing of the Academy, under the direction of Mr. C. A. Vaeth, teacher of printing. The pamphlet contains quite a complete synopsis of the four years' course, including the textbooks, reference books, and outlines of the usual shop and library work of a successful course which prepares its students for the local electrical industries.

PUBLICATIONS RECEIVED

General Shop Courses for Junior High Schools, Lancaster, Pa. The courses are suitable for the try-out period in each junior high school and the equipment is identical in the several schools. The courses comprise machine shop and auto construction, applied woodwork, and electricity, together with projects, material, tools and processes, and the lessons are flexible and arranged to suit the individual requirements and shop equipment.

Agricultural Education. Organization and Administration. Bulletin No. 13, Agricultural Series No. 1, April, 1926. Issued by the Federal Board of Vocational Education, Washington, D. C. The pamphlet is a revised bulletin, bringing up to date the administrative policies of the Federal board as they relate to vocational education in agriculture of less than college grade, as well as giving additional information and suggestions concerning the organization and administration of state programs in agricultural education. It was prepared by Dr. C. H. Lane of the agricultural education service, and takes up such phases of the subject as provisions of the national education act, the training of teachers under the supervision of the state board of vocational education, and studies and investigations of the state and federal boards, the U. S. Department of Agriculture and the U. S. Bureau of Education.

Earning a Living by the Pen. Vocational Opportunities in Journalism for Young Women. By Burges Johnson. Price, 50 cents. Issued by the Bureau of Publications of Vassar College, Poughkeepsie, N. Y. The material is the result of a questionnaire into the employments entered by some two hundred young women graduates of the College, especially those employments involving the skilful use of the pen or the typewriter. It consists of extracts from letters of those engaged in editorial work, private secretaryships, publicity work, advertising, bookstore work, library work, and work in educational and technical publishing offices.

Mr. Frills, an artist, and **Mr. Try Square,** a practical man, characters taken from the INDUSTRIAL-ARTS MAGAZINE editorial pages, were represented in the graduation exercises of the high school at Lockport, N. Y. The two characters, represented by two senior students, argued the value of art for art's sake and art for utility's sake, and according to the Lockport Union-Sun and Journal, aroused considerable interest. The material for the evening by Frills and Try Square was prepared by Miss Carrie E. Harmon of the art department of the Lockport High School.

New Shop Department. The board of education at Lincoln Nebraska, has awarded a contract for the construction of an addition to the Senior High School at a cost of $235,000. The contract calls for the completion of the unit by December 31, 1926. The unit will consist of six shop laboratories; namely, carpentry, auto mechanics, electricity, machine shop, printing, and drafting, two art rooms and nine classrooms. The general industrial arts courses will be offered from 8:30 to 2:00 and the unit trade courses from 2:00 to 5:00 P. M. The industrial arts and vocational education program is under the supervision of John R. Patlow.

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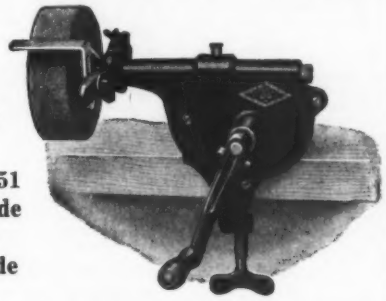

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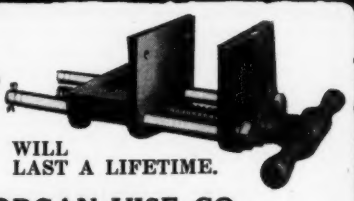

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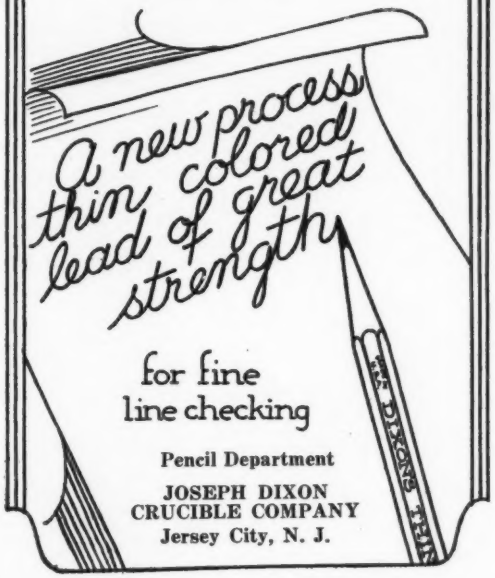

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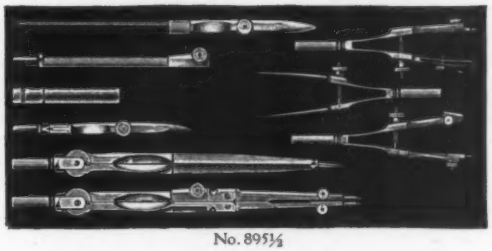

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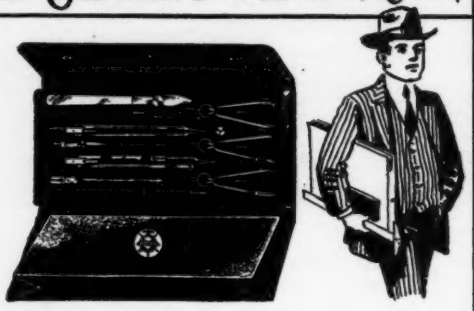

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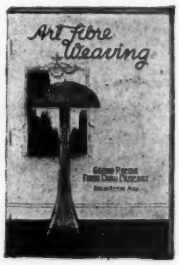

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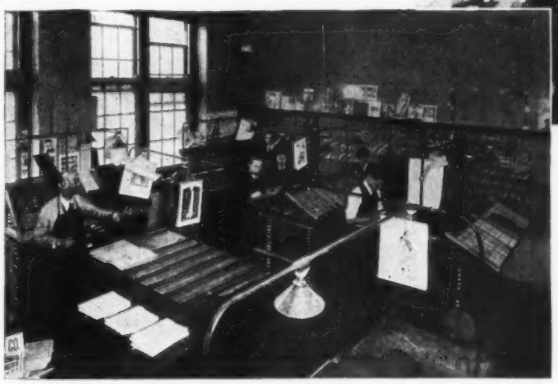

VIEWS OF THE CENTRAL HIGH SCHOOL
WASHINGTON, D. C.

[NOTE—Mr. Clark had the two photographs taken of his "practical shop," as he terms it, in which high-speed production is maintained. Mr. Clark is of the old school, having been trained in all branches of the printing arts. Besides typography, he imparts to the students his knowledge of advertising, bookbinding and presswork, dwelling particularly upon color work, "which takes the dryness out of the work and makes it less monotonous." Besides having a wide mechanical knowledge, Mr. Clark has teaching ability, which accounts very largely for the success of his department.]

The Instructor of Printing in Central High School, Washington, D. C., MR. W. FRANK CLARK, *writes about the interest the study of Printing has created in the school, emphasising the educational value which the printed matter produced by the students in the Printing Department has had upon the entire school of 3400 students:*

Our printing equipment is up-to-date and large enough to supply the school with the printing it needs. We have two Chandler & Price presses, the larger one with long fountain and vibrator; a wire stitcher, a 26-inch C. & P. paper cutter (enclosed belt), three imposing stones, ink cabinet, twelve type cabinets and a cylinder press. There is an ample supply of type, rules, leads and slugs, and miscellaneous materials. To my mind it is a finely equipped shop which Barnhart Brothers & Spindler installed for us. The thing we are much in need of is more room, but we manage to get along fairly well, even though somewhat crowded.

We are enabled with this plant to print everything needed for Central High School, and in addition some for other schools.

Each week we print 2900 four-page papers, 19x24, and monthly 2500 copies of "The Review," Central High School's 48-page magazine, with cover, the size of which is 9x12 inches, done in two colors. Then there is a large quantity of miscellaneous job work constantly called for, which is handled by the students in a most efficient manner.

We have forty-four students, an average of eleven to a class who are always interested in their work, so intent on what they are doing that the closing bell very often is not heard by them. Their ages range from twelve to eighteen. I have found the younger students more apt in learning the technical operations, because they apply themselves better to the study, probably due to the fact that they have fewer attractions to keep them out late at night.

On the whole I have a fine lot of young people in whom I take a great interest. Some of them I place with advertising concerns, while others find their way into commercial print shops, after they are through with their school studies

Every community should have printing taught in school; in fact, every school should have a well-equipped printing plant. There is more interest created in a general way in the school because of this study than can be secured by any other method.

Take our monthly magazine, for example. There is a well-organized staff of students who write for and manage this paper. There is an editor-in-chief and three assistants, seventeen department editors, a business staff, consisting of a manager and assistant, advertising manager and assistant, and a cashier and bookkeeper. We also have ten semester reporters and four floor managers.

Our magazine carries twelve pages of advertisements, which, of course, is a source of income and enables us to print it.

Contributions to our magazine come not only from the staff members, but from other students as well, providing a fine training in journalism, and with each succeeding issue there is created an inspiration which calls for greater effort on the part of the writers to submit the best thoughts for publication in the journal which is all their own.

Of course, the print shop plays an important part in this school activity—it makes it possible for Central High School to have its own magazine.

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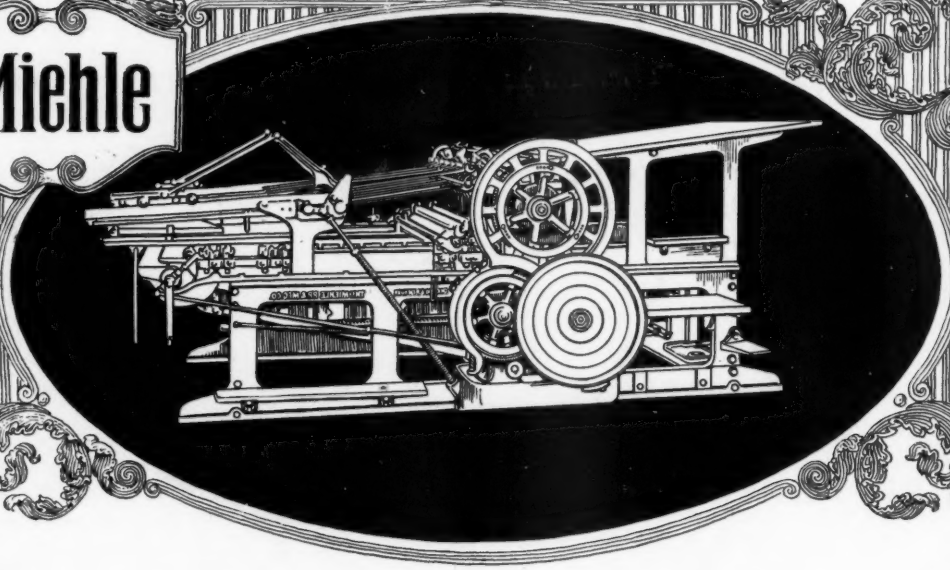

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